

UNIVERSITY OF OSLO
Department of informatics

Tablet use
**An empirical investigation of a
learning situation**

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Abstract

Our empirical study falls under the domain of tablet computer use in a learning environment for higher education. We investigated various opportunities which employed iPad use in higher education. This included the reading of a syllabus and writing notes in terms of usability and interaction design, and how that can change the way we study today. We also looked into how we can make the current syllabus interactive and innovative based upon the ideas and findings from our study.

The collection of empirical data was conducted in a University involving a team of researchers and students from the geosciences field of study. Our research model is based upon both quantitative and qualitative data collection methods, which involves observation, surveys, interviews, and focus groups. The raw data has been analyzed, compared, and transcribed. Patterns were discovered in the data enabling the drawing of conclusions and discussion about student perceptions, and use of tablets in their essential tasks.

Our findings show how tablets should be integrated in higher education with a digitalized syllabus. It also shows the strength and weakness of tablet technology over pen and paper, and how we can implement those findings to create a new way of interaction with a syllabus where the learning factor is emphasized.

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1 Introduction

The background of the elements involved in this project, together with what our motivation and focus is in this thesis will be explained in this chapter.

1.1 Background

Paper is the traditional material for reading and writing in general, especially for educational purposes. Paper based text and notebooks are being used in the whole education sector, starting from Kindergarten and going up to the University level. Interestingly enough, the digital syllabus is being promoted by libraries and used by students in higher education. The usage is mostly limited to the desktop and laptop computers. The challenge the digital syllabus is facing is the usage of printing in paper form. An environmental survey at the University of Oslo shows an increased use of the printer when using digital literature.

The University of Oslo Library is committing time and resources on exploring and using ubiquitous computing technologies for educational purposes. They have had similar projects like ours with eBook readers with negative feedback from the students in terms of satisfaction and performance. The eBook readers screen sizes were either too small, or they delivered very slow performance.

A tablet is being used for various reasons today; everything from reading books, studying, entertainment, web surfing, checking email, gaming, or checking status updates on social networks. The tablet has existed for several years but has not been mainstream until last year when the iPad tablet was launched. During the first week of the launch, it sold 300000 units. By the end of 2010, 17.6 million units were sold making the iPad the market leader in the tablet domain. It created a new era in the tablet market with its touch screen and user friendliness. According to a report from Gartner, the iPad operating system (iOS) will have the lead among its competitors until 2015. (Gartner, 2011)

iPad is being used in various use cases. This project is focusing on the use of a tablet in a University environment where it is replacing syllabus textbooks with electronic files presented in a new way. This thesis is about how the tablet technology is adapted by the users and how we can improve their user experience based upon our empirical data. The students are from the geology department at University of Oslo. During this process we will get

sufficient insight to deliver suggestions and solutions on what can be done better towards incorporating tablet in a learning situation considering ubiquitous computing, interaction design and usability, such as context awareness, gesture recognition, affordance, mental model and natural user interfaces.

1.2 Motivation

This study is motivated by several factors based upon our experience and interest.

- **HCI (Human-Computer Interaction) and tablet technology**

We have a passion for new technologies, especially those that can change the future of people interacting with computers. This is what HCI is about.

We find it interesting to see the use of mobile and ubiquitous computing in an academic context, since we have been there and understand the importance of the usability and efficiency of a system in a learning situation. It is inspiring to know that we will get insight on how tablet technology can change the way we study. Seeing how students use different applications and services, and how they adapt and learn such technology helps us towards getting a better understanding of interaction design. The knowledge we'll receive about tablet interaction will help us in the development and understanding of interaction design on touch-screen enabled devices.

- **Replacing the paper and the pen**

It is motivating to replace something and thus create a new era through the help of Information Technology. This topic is one of most interesting we've worked on, especially since the technology is new for learning purpose and there isn't a lot of research on it. The challenge to discover if a tablet from the 21st century can replace paper from the 2nd century motivates us.

- **University of Oslo Library / Green UiO**

The institution and the organization have motivated us with an agenda to reduce unnecessary use of resources, which in our case is paper. We will like to see this happening in all sectors in society, and not only in the educational sector. We believe that ubiquitous computing can help us with that.

- Benefit

The question of how a regular student can benefit from cutting edge technology is something we would like to discover in this thesis. It is not only about student study; it also gives us an overview and perspective of a student's daily life we have not seen before.

1.3 Research Area

Today it's quite common to read articles, newspapers, magazines, and books via computers and handheld devices instead of using their paper versions. A recent report from TNS Gallup in Norway shows a tremendous increase of views on mobile sites (Gallup, 2010). Today's tablet is a very popular device for reading purposes. In a recent report from digi.no, about five percent of the population of Norway (equivalent to almost 250,000 users) has already purchased a tablet device like the iPad, Samsung Galaxy Tab, or Amazon Kindle (which enabled eBook reading this year in Norway). (Jørgenrud, 2011) This clearly means that people are trying to adopt new digital technologies for reading purposes.

The research area is defined by understanding the user experience and usability goals, and how it should be improved or changed. (Preece et al., 2002) In this paper, our research focuses on how tablet technology can be utilized for study purposes in a learning environment. This involves reading syllabus books, annotating, and then writing notes. We want to exploit the usability, interaction, and affordance properties of the iPad and its pre-chosen applications which facilitate students to perform study-associated tasks in an easy and efficient way.

1.4 Research Questions

1. How can iPad tablet change the way people study today?

The local CD shops have decreased; we have more online solutions which is covering our needs. The same thing is happening with books now, where eBooks is slowly taking over the market. Video is also suffering the same paradigm with solutions like Netflix¹ and VOD². All of these incidents have a shared outcome, to be digitalized.

¹ Netflix is a service offering online flat rate DVD and Blu-ray disc rental-by-mail and video streaming in the United States.

A new era of tablets has been introduced in ubiquitous computing. The traditional way of studying is to buy textbook syllabus and write in notebooks using a pen and paper. We will like to figure out what potential the iPad tablet got in this matter.

2. What are the main challenges for students in terms of usability and affordance to adapt a tablet technology over pen and paper?

The challenge to switch from something you have used your whole life to a new technology is challenging itself. We will explore and go in depth of the challenges the students have to face during this adaption of tablet technology.

3. What are the advantages and disadvantages of using tablet technology over pen and paper?

The benefits and weakness of the iPad tablet over the pen and paper will be discussed from our experience in this study

4. How can we make the tablet syllabus interactive and innovative for study purpose?

The way syllabus is today has not been changed for a long period of time. We want to find out if the iPad tablet can provide an interactive and innovative for study purpose using the benefit of its features and hardware.

5. Develop success criteria for incorporating a syllabus on a tablet in a learning environment?

There are factors which can either make a projects fail or succeed. We would like to find out the different success factors and highlight those in a tablet and learning context.

1.5 Chapter overview

The thesis is organized into seven main chapters. The following is an overview of all of these chapters.

² Video on Demand (VOD) are systems which allow users to select and watch/listen to video or audio content on demand. IPTV technology is often used to bring video on demand to televisions and personal computers.

Chapter 1 (Introduction)

This chapter provides our research motivation for the thesis. It goes into the detail of the purpose of the work, such as research questions and the research area. It continues with the structure of the work, and explains terms related to the tablet domain.

Chapter 2 (Research methodology)

This chapter defines our quantitative and qualitative data gathering techniques. It also describes which methodology is used for our empirical study, and how the data is analyzed.

Chapter 3 (Theory)

This chapter represents a literature review of the theory used in this thesis, which has served as the source to provide answers to our research questions. It introduces goals and the history of HCI (Human Computer Interaction) together with different design principles and interaction form where the focus is on natural user interfaces with gesture recognition. Further, the chapter goes into understanding users and their set of conceptual models. Topics within Ubiquitous and Mobile computing are explained in the end.

Chapter 4 (Case)

This chapter is our thesis case explained in detail and depth. It explains how the project is planned and who is involved. It clarifies which role we have and the process of the software setup.

Chapter 5 (Findings)

All important findings and results from our empirical study are presented in this chapter. The results are shown from our observations, interviews, surveys, and focus groups that are based on user's feedback.

Chapter 6 (Analysis and discussion)

The discussion of research questions applied to our theory and findings is in this chapter. This section is the result of our analysis of the thesis.

Chapter 7 (Conclusion)

This chapter offers a conclusion for our research questions with suggestions, and offers information about what needs to be done in the future regarding our research area.

1.6 Definitions

iPad

iPad is by definition a tablet device. It is designed, developed, and marketed primarily as a platform for content media including books, periodicals, movies, music, games, and web content.

eBook

eBook is the digital representation of printed material (print book). The medium can vary from a (laptop) computer to a digital eBook reader, PDA, mobile phone, or even (through a desktop printer) traditional paper. Usually the content is available in PDF or HTML format, but also plain text or XML formats. This makes the content more versatile and flexible than the traditional printed book.

On-Screen keyboard

On-Screen keyboard is an application which provides a visual keyboard on your display screen that can be used in place of a physical keyboard. The On-Screen keyboard can be manipulated by the finger, mouse, or other pointing device.

App store

The Apple app store is an online distribution software store for Apple products such as the iPad and iPhone.

Stylus

Stylus is a pen-shaped device used to interact with a touch screen devices.

2 Research Methodology

This chapter describes quantitative and qualitative data gathering methods such as observations, questionnaires, interviews, and focus groups and how they were analyzed and measured.

Research is a scientific and systematic search for pertinent information on a specific topic.

(Kothari, 2004) In fact, it is the way to investigate the problem and it gives the answers to our research questions (section 1.4) which we are looking for. Further, it helps us to find something new which has not yet been discovered. This is the successful approach for discovering truth. *Research methodology is a way to systematically solve the research problem by logically adopting various steps, and it helps us to understand not only the products of scientific inquiry but the process itself.* (Sridhar, 2008)

2.1 Quantitative and qualitative methods

Our search criteria are based on both quantitative and qualitative data collection methods. Qualitative research is an investigation by which we will find the answer for our problem systematically. This means that we will gather data by collecting evidence and produce findings that were not determined in advance. Further, it gives a textual description of how people experience ideas, opinions and feelings about a given research issue. The quantitative method is based on the measurement of quantity or amount. (Kothari, 2004)

Quantitative method has a data format of numbers and statistics. Questions are mostly closed which means that participants may randomly assigned different values depending on the research question. In the end, results are easy to summarize, evaluate, and generalize. *There's no such thing as qualitative data. Everything is either 1 or 0.* (Miles and Huberman, 1994)

This is compared to the qualitative method that has data formats of notes, pictures, audiotapes, and videotapes. Questions are open ended which means that the participants are open to responses in their own words. In the end the records are richer, time-consuming, and less able to be generalized but *all research ultimately has a qualitative grounding.* (Miles and Huberman, 1994)

The term quantitative is predominantly used as a synonym for any data collection technique (such as questionnaire) or data analysis procedure (such as graphs or statistics) that generates or uses numerical data. In contrast, qualitative is used predominantly as a synonym for any data collection technique (such as interview, observation and focus group) or data analysis procedure (such as categorizing data) that generates or uses non-numerical data. Qualitative therefore can refer to data other than words, such as pictures and video clips. (Saunders et al., 2009)

2.2 Data collection methods

Collecting data plays an important role in any type of research study. It needs advance planning for gathering correct and evidence based data. It is also essential to decide how we are going to gather data for the problem we are solving. We are going to use data collection techniques which helps us gather data systematically, otherwise the data is collected haphazardly, thus producing answers that is difficult to measure for our research questions (section 1.4) in a convincing way.

There are a number of ways of collecting data which we have used in this project. We have used three types of qualitative methods which are participant observation, interviews, and focus groups. For quantitative research, we have used questionnaires as a data gathering method.

2.2.1 Observation

This is the first method which we have used for our data collection. By using this method, a researcher will directly analyze what is going on directly in the field. Observation is one way to collect primary data. It is a purposeful, systematic and selective way of watching and listening to an interaction or phenomenon as it takes place. (Kumar, 2005)

There are two types of observation:

1. Non-participant observation
2. Participant observation

Non-participant observation is when you, as a researcher, do not get involved in the activities of the group but remains a passive observer, watching and listening to its activities and drawing conclusions from this. (Kumar, 2005)

In our case, we attended in a non-participant observation during the handout of the tablets to the students. During this session, all of the students were invited into the library where the registration, installation and setup of the syllabus and the required applications were taking place as shown in Figure 1 below. The agenda was to get started with the tablet and learn how things work on it. We observed the students closely in all of these processes on the sideline. Observations were being written down, audio and video taped. Photos were taken in additional.

Various processes were observed which we have covered as follows:

- How they are going to use the iPad tablet?
- How they will interact with the product for the first time?
- Is there any obstacle they face when they interact with the product?
- What are their responses about the idea of a tablet syllabus?



Figure 1 shows non participants observing the iPad

Participant observation, on the other hand, is when you, as a researcher, participate in the activities of the group being observed in the same manner as its members, with or without their knowing that they are being observed. (Kumar, 2005)

During the study activity, lecture, we attended as participant observers. We sat among the students and wanted to see how the students utilize the iPad tablet use in their classroom and lecture. We followed the lecture in order to understand when and where in the syllabus the tablet was needed and in what setting and how the tablet was used for taking notes and overall, a general user observation. Our observation was written down as regular notes.

2.2.2 Interviews

Interview is a formal face-to-face meeting, especially, one arranged for the assessment of the qualifications of an applicant, as for employment or admission. A conversation, as one conducted by a reporter, in which facts, or statements are elicited from another. (Morris, 1982)

Interview qualifies as a qualitative data gathering method. We decided to use this method since it was flexible and personal in our case, which means we could change the questions and the order of them if we wanted to investigate more, based upon the reaction and the answers from the interviewee.

During the interviews in closed meetings rooms, we received their thoughts, suggestions, and information around the project. There were two reasons why we conducted an interview session. The first was the challenges we observed during the participant observation. Secondly, some questions from the questionnaire session were a bit unclear. We wanted to put those questions in front of them to explore their answers further which they gave during the questionnaire. Besides, a closed meeting room gives you a personal relation to the interviewee and makes the interview quality better as compared to a session outside. No doubt, it was a valuable and wonderful experience. Notes have been recorded for further use.

2.2.3 Focus group

A focus group is a carefully planned discussion designed to obtain perceptions on a defined area of interest in a permissive, nonthreatening environment. (Krueger, 1994)

A focus group session starts with an introduction of the participants, which includes a short background about the project to which they are invited. Discussion starts, and during it, participants share their ideas and opinions in a comfortable and enjoyable environment. Throughout the session the participants produce qualitative data and data of interest for the researchers. It provides a more natural environment rather than what an individual interview will do. The researcher has different responsibilities and functionalities such as moderating, listening, observing, and analyzing. Focus groups are very useful before starting or during the project such as in planning, and the need for assessment and analysis. (Krueger, 1994)

During our focus group, we invited all of the students to participate in a session (see Figure 2 below) where we asked specific questions that were taken from the outcome of the questionnaire, interviews, and observations. The students were divided into four groups. Two groups were led by professors while the other two groups were led by us with the help of two master students. Our agenda was to go through both theoretical and practical questions. In the theoretical questions, our focus was on syllabus, challenges, and an interactive syllabus. In the practical side, our focus was on the applications used in the project and to provide a practical overview of an interactive syllabus. We used audio recorders, laptops and digital cameras which helped us to analyze the data later.



Figure 2 showing the invitation board for our focus group workshop

2.2.4 Questionnaires

The word "questionnaire" is sometimes used to distinguish a set of questions, including perhaps some open-ended ones, from more rigidly constructed scales or tests. (Oppenheim, 1992)

We obtained information from the participants by conversing with them, just as two neighbors will do. In this way we might not obtain all the information we want, because in a conversation we are likely to forget some of the topics that we should talk about. Later, the data processors have to tabulate the information obtained by us. This would be impossible for us to do if each of us has a different conversation with each participant. For these reasons, the questions that we will ask should be written down in advance. These questions can be presented to the participants in two different ways:

1. Close-ended questions
2. Open-ended questions

Close-ended questions are used when the contestant must choose an answer from a list of possible options. Such questions are important for obtaining exact information. These kinds of questions are difficult to make but easy to summarize and tabulate. *Closed questions specify a task and also the range of possible responses to it. The respondent is forced to choose from one of a set of numbered options (although one of these might be 'don't know' or 'cannot decide'). (Sapsford and Jupp, 1996)*

Open-ended questions allow free responses from the participants which should be recorded exactly as they say it. Such questions are important for acquiring information in depth. It allows us to explore deeply into the problem of interest being raised. These types of questions are easy to make but difficult to summarize and tabulate. *Open-ended questions pose a question or specify a 'task' just as closed questions do, but the informant has the freedom to answer in his or her own way rather than in terms of the researcher's predefined answer categories. (Sapsford and Jupp, 1996)*

We made a web based survey by using SurveyMonkey³ and sent a link to the participants via email. After receiving the survey link, the participants can answer the survey. We also used

³ SurveyMonkey.com is an online survey site that simplifies the survey process considerably.

the programming logic of if & else in the survey, which enabled students to get the next question based upon the answer of the previous question. In order to write our questionnaires, we had an internal brainstorming and discussion session among all the involved parties in the project. The main goal in the first questionnaire was to collect more information from the students about their background, experience, syllabus, entertainment, collaboration and communication, limitation, and some other issues related to the iPad tablet, pen and paper, and a computer. The second questionnaire was also conducted after two days of discussion internally, where the student's final views and opinions about the iPad tablet in terms of syllabus and its use in a learning environment were emphasized.

2.3 Data analysis

The main objective of case study research is to help bring greater clarity and contextualized understanding to a case (Coverstone, 2003). Data was collected by the method described above in section for data collection methods. Combinations of the quantitative and qualitative methods helped us to enhance the overall analysis of the case.

Quantitative data analysis

The analysis of quantitative data needs to be processed because such data is in a raw form. It can be utilized and made helpful by turning it into information by creating graphs, charts, and statistics as shown in Figure 3 below. These techniques help us to explore, present, describe, and examine relationships and trends within our data. (Saunders et al., 2009)

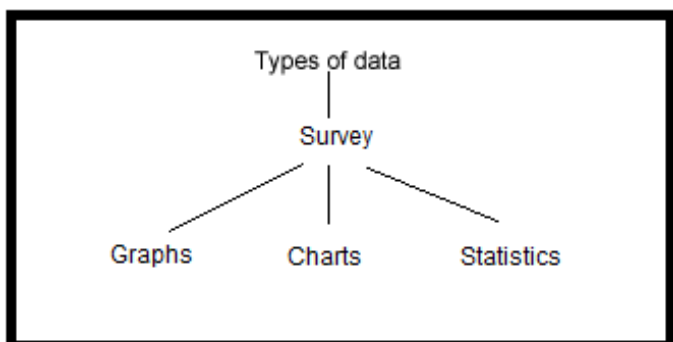


Figure 3 shows interpreting data collected during quantitative research.

Qualitative data analysis

This type of information refers to all non-numeric data as shown in Figure 4 below.

Qualitative data has not been quantified and can be a product of all research strategies. It can range from a short list of responses to open-ended questions in an online survey, to more complex data such as transcripts of in-depth interviews or focus groups. This data needs to be analyzed and then understood. Qualitative data analysis procedures assist this, allowing you to develop theory from our data. The key factor is to sort out all the pieces.

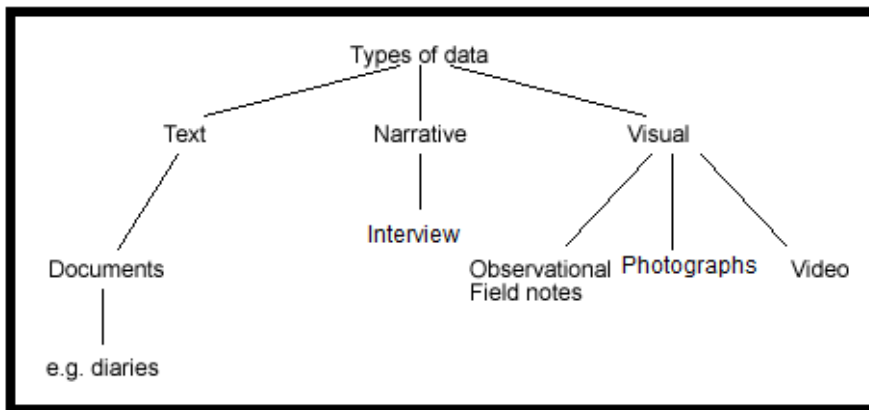


Figure 4 shows interpreting data collected during qualitative research.

3 Theory

This chapter will focus on the theoretical part related to our task with the keywords of HCI interaction design, usability and ubiquitous computing. We look on these different areas of the field, and create main points to understand the findings and analysis that are discussed later in the thesis.

3.1 Human Computer Interaction (HCI)

The term human computer interaction came up in the mid-1980s. (Finlay et al., 2004) Since then, various definitions have been provided including:

HCI is a study of the interaction between people, computers and tasks. It is mainly concerned with understanding how human being and computer can interactively perform tasks and how such interactive computers are designed. (Johnson, 1992)

In a broader characterization it is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them. (Preece and Rogers, 1994)

HCI is the study of people, computer technology, and the ways these influence each other. (Finlay et al., 2004)

In fact HCI is a multi interdisciplinary field of study that is concerned with increasing user performance by enhancing the usability of the product.

3.1.1 Components of HCI

The term Human Computer Interaction can be divided into three concepts: human, computer, and interaction.

Human

In the context of HCI, a human who is trying to achieving something using the technology is referred to as a user. A user can refer to an individual user, a group of users working together,

or a sequence of users in an organization, each dealing with some part of the task or process. (Finlay et al., 2004)

Computer

The computer term refers to the technology that is being used by the user to complete the task or action. By computer we mean everything ranging from a desktop computer to a large scale computer system, a process control system or an embedded system. (Finlay et al., 2004) A computer system consists of people, computers and other components that interact to produce a result that the same components could not produce independently. The system may involve one person working with a particular tool to attain a specific goal or a large group of people working with many tools to meet a shared goal. (Bailey, 1996)

Interaction

The last term, interaction, refers to the direct or indirect communication between the user and the computer to complete a task, or to achieve a specific goal. Direct interaction involves a dialogue with feedback and control during the execution of a task, in other words, where the user is constantly providing instructions to the system and receiving feedback. While indirect interaction may involve background or batch processing. It means that user gives all the information to the computer at once and leaves the machine to perform the task. (Finlay et al., 2004)

3.1.2 Goals of HCI

The fundamentals goals of HCI are to develop or improve the safety, utility, effectiveness, efficiency and usability of systems that include computers. In fact the goals of the HCI are to produce a usable and safe system, as well as a functional system. The term “system” not refers only to the hardware and software, but covers the whole environment such as people working in an organization, at home, or any other place that is affected by the computer technology in question. Safety has a very high level of importance in computer science regarding the design of a safety-critical system. Utilities are functions of the system which the user uses. Improving effectiveness and efficiency are self-evident and ubiquitous targets. (Diaper, 1989) Usability is a key concept in HCI and is used for making a system easy to use and easy to learn. (Preece and Rogers, 1994)

3.1.3 History of HCI

In the early stages of computer development people used *Batch Interface (BI)*⁴ to perform their tasks on the computer. These tasks are stored in batch files and executed later at the end of a session. In 1950, *Command Line Interface (CLI)*⁵ came up, which is a more effective way of communicating with the computer. It is the real beginning of Human Computer Interaction. Research which was done early in HCI is very successful. One example is the *Graphical User Interface (GUI)*⁶ of Windows 95. Another remarkable example of HCI research is the World Wide Web, which applies hypertext technology to a browser which connects the world with one mouse click. The Star, Dynabook, and the Apple Lisa are three systems that provide landmarks along this evolutionary path of HCI. An important combined theme for the three systems is that they provided a form of interaction that proved effective and easy for beginners and experts. They provided interfaces that were easy to learn, and objects could be directly manipulated while the system gave immediate feedback. (Myers, 1998)

The Star

Star was conceived in 1975, but its ideas were born dating back to more than three decades.

Memex: The designer of the early calculator, Vannevar Bush, wrote an article about his vision of the uses of electronics and information technology in 1945. Computers at that stage were of huge size and used for military number crunching. He envisioned a personal, desktop computer for non-numerical applications and named it the Memex. The idea languished for 15 years due to insufficient technology. (Johnson et al., 1989)

Sketchpad: In the sixties people began to take interactive computing seriously. Ivan Sutherland was the one person who built an interactive graphics system called Sketchpad as shown in Figure 5. Its innovations was master drawing of which users could create duplicates. If the user changed the master drawing, all the instances of

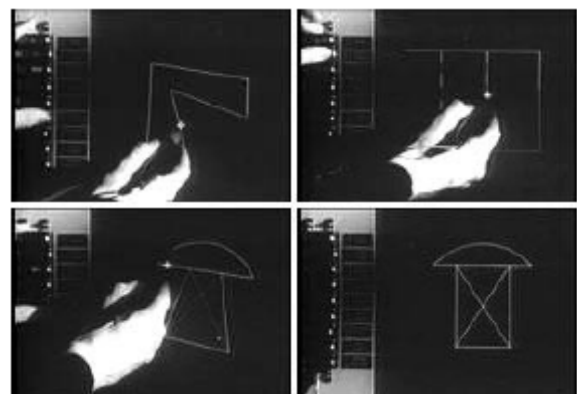


Figure 5 shows Ivan Sutherland's sketchpad.

⁴ Batch Interface takes input as set of commands in order to execute, and save output in a data file.

⁵ Command Line Interface generates outputs by typing commands directly on the terminal.

⁶ Graphical User Interface is another way to interact with the computer by graphical such as menus, icons etc and which can manipulated by a mouse, keyboard etc.

the drawing would change as well. User can create graphical figures, move them, and change their size etc., on a CRT⁷ display using a light pen. It was actually a seed for making important interface ideas. (Johnson et al., 1989)

NLS: The oN-Line System was established by Douglas Engelbart in the sixties as shown in Figure 6. It was implemented with what was to be called hypertext. It had some key tools such as teleconferencing, email, word processing, hypertext linking, idea development editors, and user controlled configuration and programming. (Johnson et al., 1989)



Figure 6 shows Doug Engelbart's demonstrated a mouse, video conferencing, e-mail, and hypertext on the NLS (oNLine System) to 1,000 attendees on 9th December 1968.

The Mouse: The mouse was developed at Stanford Research Laboratory in 1965 as part of the NLS project to be a cheap replacement for light-pens, which had been used at least since 1954. (Myers, 1998)

Xerox Star: Star was an office automation system. The idea was that users in an organization would have a workstation on their desks, and they could perform various tasks to produce retrieve, distribute, and organize documentation. The bitmapped screen, windows, mouse driven interface, and icons are the important features that distinguish it from other computers. (Myers, 1998)

Xerox PARC: The Xerox Star established Palo Alto Research Center (PARC) in 1970 to explore technologies for the office environment such as laser printing, Ethernet, GUI etc. Later on, many interaction techniques such as how objects and text are selected, opened and manipulated became popular and were researched at Xerox PARC. The idea of “WYSIWYG (what you see is what you get)” originated there with a system such as the Bravo⁸ text editor. It means that the final output look is the same as the content displayed during input. The Star designers were challenged to make the personal computer usable for a community that did not

⁷ Cathode ray tube

⁸ Bravo was a text editor of its day with on-screen underlining, boldface, italics, variable font families and sizes, and variable-width characters.

have any previous computer experience. (Johnson et al., 1989) The first commercial systems to use direct manipulation⁹ were the Xerox Star in 1981, the Apple Lisa in 1982, and the McIntosh in 1984. (Myers, 1998)

Dynabook

Alan Kay designed the first object-oriented programming language called Smalltalk in 1970. It was the basis for what is now known as windows technology, i.e., the ability to open more than one program at a time on a personal computer. However, when he first developed the idea, personal computers were only a concept. In fact, the idea of personal computers and laptops also belongs to Kay. Alan He envisioned the future Dynabook as shown in Figure 7, a notebook sized computer with a keyboard on the bottom and a high-resolution screen at the top. (Kay and Goldberg, 1977)

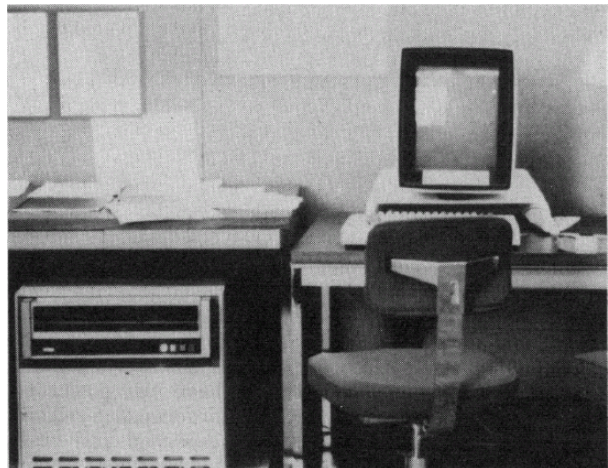


Figure 7 shows the interim Dynabook system consists of processor, disk drive, display, keyboard and pointing devices.

Apple Lisa

Apple Computers developed Lisa in 1983 which was based on Xerox PARC graphical user interface research in the SmallTalk environment. The Lisa computer (Figure 8) had an important advancement in that it was an easy-to-use computer situated at home which performed tasks. (Perkins et al., 1997)

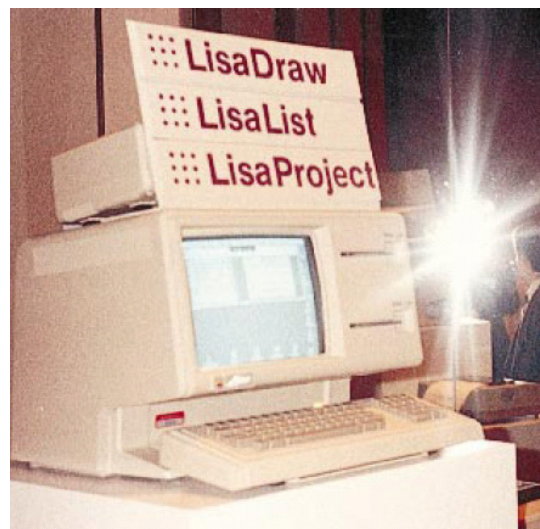


Figure 8 shows Apple Lisa Computer

⁹ Direct Manipulation is a user interface technique that gives user to control the system by manipulating objects directly. Examples are menus and mouse by which user manipulated objects directly instead of using commands.

3.2 Usability

Usability is a quality attribute that assesses how easy user interfaces are to use. The word "usability" also refers to methods for improving ease-of-use during the design process.

(Oppermann, 2001)

Usability is how people use a system to achieve their most important task in a simple and natural way. Usability is a necessary condition for survival of any system such as web, applications, computer systems, etc. If these systems are difficult to use, people will leave and find other competitors. (Nielsen's, 2003) The capability in human functional terms to be used easily and effectively by the specified range of users, given specified training and user support, to fulfill the specified range of tasks, within the specified range of environmental scenarios as shown in Figure 9 and Figure 10 below. (Shackel and Richardson, 1991)

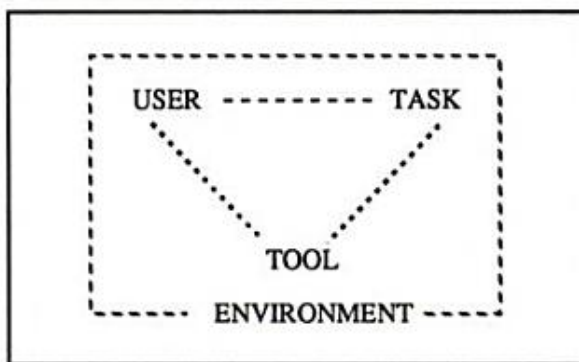


Figure 10 shows the four principal components in a human-machine system.



Figure 9 shows these joint authors as Users are revising a paper (Task) for an electronic journal using a computer and VDT (Tool) in the Environment of a research centre.

Usability has been difficult to measure and evaluate. To make usability a more measurable concept, a number of usability characteristics have been identified. Hence, usability is not a one-dimensional concept, but rather consists of multiple characteristics that should be considered when specifying and measuring the usability of products. (Preece et al., 2002)

Usability goals and related metrics are not relevant to every product. (Preece et al., 2002) A system is used within a specific context with particular characteristics by the user to perform specific tasks in a specific environment. Thus, usability is a function of the context of use (Bevan, 1995), and that context can change the usability of the system.

3.2.1 Context of use

The context of use discover who the intended users of the product are, what kind of tasks the users will perform with the software, and the equipment and environment that will be used in conjunction with the software. (Jacko and Stephanidis, 2003) Context has been divided into user, task and environment. (Bevan, 1995)

The user context: Users share common capabilities but are individuals with differences, which cannot be ignored. (Finlay et al., 2004)

The task context: The task context considers all characteristics of the task that could influence the user while using the computer to perform that task. (Jacko and Stephanidis, 2003)

The environment context: There are different environment context such as physical, social and technical. This is an important context to believe as it sometimes happens that a certain category of user carries out exactly the same task in two different environments. (Jacko and Stephanidis, 2003)

3.2.2 Goals of usability

Preece et al. defined six quality components of usability: effectiveness, efficiency, utility, learnability, memorability, safety.

Effectiveness

Preece describes effectiveness as how good a system is at performing task what it supposed to do. By this he means how accurately users can accomplish its task for example how to print a document. How easy is it to access the information user needs? (Preece et al., 2002) There is a difference between effectiveness and utility that is if the system provides all necessary utilities, but if users cannot find a utility item, the system lacks effectiveness.

Efficiency

Efficiency is to calculate how quickly users will achieve their goals by using a system. This may be evaluated through time, or number of steps necessary to accomplish a task. An e-commerce site is an example where users make a purchase for the first time, as they entered

personal information for making a purchase. If they want to purchase in the future they don't need to re-enter their personal information again. (Preece et al., 2002)

Utility

Utilities are services that the system provides functionality enabling users to do what they want to do. An example of such a system is accounting software which offers computational tools that users can use to calculate tax returns, salary, etc. (Preece et al., 2002)

Learnability

Learnability is the capability of the system which enables a new user to perform their tasks or interaction in an easy way when they use the system for the first time. (Finlay et al., 2004)
People don't want to spend much time on learning and usage of a new system because they want to get started quickly. If they get a problem, they try to find another competent system. (Preece et al., 2002)

Memorability

Memorability can be described as the remembered performance of a task by the system when the user has not used the system for some period of time; how often the system memorized the performance of that task. For example, users get help to memorize the sequence of an operation via purposeful icons, command names, and menu options. (Preece et al., 2002)

Safety

Safety involves protecting the user and the data. The first aspect regarding safety of users refers to external conditions where there are hazardous conditions like x-ray machines, or chemical plant operators who should be able to interact with and control a computer-based system remotely. The second aspect refers to helping users in any kind of situation avoid the dangers of carrying out unwanted actions accidentally. By making the systems safer such as not placing the quit or delete command right next to the save command on a GUI menu. (Preece et al., 2002)

3.3 Interaction design

The term interaction design defines as designing interactive products to support people in their everyday and working lives, interaction design aims to develop interactive systems that are easy, effective and enjoyable to use from the user's perspective. (Preece et al., 2002)

During the past twenty years technology has vastly improved. If we look around us and consider how many interactive products are used in daily life today, we come to know that these products are in large numbers. Let us take an example of a mobile device, which almost everyone comes into contact with every day, and which clearly means that the interaction with digital systems increases day by day. On the other hand, it does not mean that these systems are fully understood by users because we have many examples of poor interaction around us. The understandable thing for the designer is to design a computer system that gives a reasonably good user experience with the system. (Preece et al., 2002) *"Most people understand that how their devices work is as important as how they look. A beautiful mobile phone that functions poorly will cause months of frustration"*. (Saffer, 2010)

Interaction design creates user experiences through careful design and user research. It is about facilitating a human being through products and services in the field of education, entertainment, home, public areas, etc. It is not a science but an art, exactly like making furniture. (Saffer, 2010) HCI is interdisciplinary field involved in interaction design, the fields of human factors, cognitive engineering and computer-supported co-operative work are also important for understanding how users react, interact and communicate. These multidisciplinary fields cover various area of expertise with various concerns about computer development. Computer science is concern with design and engineering to build the necessary technology. Sociology and anthropology is to understand interactions about technology and the way human and technical-systems adapt to each other. Ergonomics is concerned with the safety of both human and computer systems. Psychology is concerned with the cognitive processes of humans and empirical analysis of the behavior of users. Linguistics is concerned with the improvement of human and machine languages and the relationship between the two. (Preece et al., 2002)

3.3.1 Goal of interaction design

It has the same fundamentals as HCI in terms of design and usability goals, but it is also concerned with other user experience¹⁰ goals like creating systems that are satisfying, enjoyable, fun, entertaining, helpful, motivating, aesthetically pleasing, supportive of creativity, rewarding, and emotionally fulfilling. It means that the system which has been developed feels good to users. That's why user experience goals are not similar to the usability goals, because they are concerned with how users experience an interactive system from their way of thinking. (Preece et al., 2002)

3.3.2 Design principles

Norman wrote another book called "The psychology of everyday things"(Norman, 1988a). The focus is on usability design where the main topic is "how to become a better designer". The suggestions that Norman puts forth are:

1. Make use of affordance where it's possible. By this we mean it should be obvious how an element can be used. The user should know how to use it by looking at it.
2. Make it easy to evaluate the current state and give feedback to the user. Information should be given to the user when action has been taken. It should be obvious when the interaction has been done by getting feedback on it.
3. Make things visible for the user that also includes the conceptual model, action, and the outcome of it. A conceptual model is a mental model the users adapt from experience, training and instructions. A good conceptual model makes the interaction relationship between a device and the user more efficient. A bad conceptual model will rather make it difficult to interact in novel situations.
4. Use natural mapping between action and the outcome. A natural mapping uses the users' cultural experience and their knowledge about physical analogies.
5. Manage complexity by keeping the number of features, actions, and controls balanced. Today we have lots of advanced devices with a big feature list. If the controls are

¹⁰ User experience is how a product behaves and is used by people in the real world.

increased for the device as the features, it will be harder for the user to understand and use the device.

3.3.3 Affordance

Norman affordances refer to the perceived and actual properties of an object, which provides some help or indication of how to use or interact with it. Affordance provides strong clues to the operation of things. (Norman, 1998) For example iPad invites touching. Designer take advantage of affordances when the user know what to do, just by looking instead of using picture, label or instruction needed. Although complex things may require supporting information, simple things should not. If they do, then the design has failed. (Norman, 1998)

Norman talks of both perceived and actual properties, and implies that a perceived property may or may not be an actual property; regardless, it is an affordance. (McGrenere and Ho, 2000) In perceived affordance, design invites people to take possible actions, however, actual affordance is the actual actionable properties of the product. Norman point out that perception by an individual may be involved in characterizing the existence of the affordance. Further, he indicates that an affordance refers primarily to the fundamental properties of an object. (McGrenere and Ho, 2000)

False affordance

Many users attempted to perform actions on perceived affordances when these actions were not actually possible on the interface. These types of affordances, often called false affordances , suggest a mismatch between a user's perception and the allowable actions on the interface itself. (Perry et al., 2011)

3.4 Interaction form

In today's world, how people use computers, mobiles, and other electronic systems will quickly change the future of technology. Technologies are so pervasive and are changing at such a rate that the interaction with computers allow us to interact with these systems on a whole different level from what we are used to. We would all be equipped with highly portable, personal communicators, and computers would recognize us from our voice prints or finger, thumb or handprints. Computers would be able to deliver the output of their interaction

with us instantaneously and in a form which was easy to use such as high quality 3D graphics. (Benyon et al., 2005) All the previous mechanical operation of button is now gradually being replaced with tools that are more comfortable and more natural for the human being to use. E-book is becoming major trend for reading, because it is also shared easy, portable conveniently. (Weiyuan, 2010)

3.4.1 Natural user interface (NUI)

This is an emerging computer interaction methodology which focuses on human abilities such as touch, vision, voice, motion and higher cognitive functions such as expression, perception and recall. It seeks to harness the power of a much wider breadth of communication modalities which leverage skills people gain through traditional physical interaction. Much in the same way the graphical user interface (GUI) was a leap forward for computer users from command line interfaces, natural user interfaces in all of their various forms will become a common way we interact with computers. The ability for computers and human beings to interact in diverse and robust ways, tailored to the abilities and needs of an individual user, will release us from the current constraints of computing allowing for complex interaction with digital objects in our physical world. (Weiyuan, 2010) Computer interfaces that support more natural human forms of communication such as handwriting, speech and gestures are beginning to enhancement or replace elements of the GUI interaction paradigm. These interfaces are praised for their learnability and user-friendliness, and their ability to support tasks such as authoring and drawing without drastically changing the structure of those tasks. (Abowd and Mynatt, 2000)

THE CHARACTERISTICS OF THE NATURAL USER INTERFACE

NUI has several characteristics user-centered, multi channel, inexact, high bandwidth, voice based interaction, image-bases interaction and behavior-based interaction. (Weiyuan, 2010)

User centered: To the changing needs of the user interface as a starting point, so that the user interface of the external form and internal mechanisms to meet the needs of different users, which is called user-centered design. Non-specific human continuous speech recognition technology will enable computers to understand the people's demands, is an important input interface and means.

Multi-channel: Multi-channel interface intended to make full use of one or more of the sensory and motor channels to capture the complementary characteristics of the user's intention to enhance the naturalness of human-computer interaction. Human sensory modalities are vision, hearing, touch, smell and balance; human motion channel has hands, mouth, eyes, head, feet and body and so on.

Inexact: Precise interactive technology is a technology that can be used to fully explain the purpose of user interaction, the user keyboard and mouse are required to accurately input. But the people's actions or thoughts are not very accurate, the computer should understand the people's request, even to correct people's mistakes, intelligent interface is an important orientation.

High bandwidth: Now the output contents of the computer has a fast, continuous display of color images, and the very large amount of information. But people are still using the keyboard input by one after another hit, so, the computer's input bandwidth is very low. Natural user interface should support high input bandwidth, fast import large quantities of information. The input and understanding of Voice, image, the posture is orientation of development in future.

Voice based interaction: This interacts with computer technology to study how people interact through natural voice or machine synthesized voice. It involves multidisciplinary field, such as linguistics, psychology, ergonomics and computer technology; at the same time, it is also a forward-looking style guide to the future of voice interactive product development and design.

Image based interaction: It is the computer based on human behavior, to understand the image, and then react.

Behavioral based interactions: This will bring a new way of interaction. User behavior can be predicted by the computer, meet the needs of users. Such as: computer follow people's attention, you can determine the user's intent, to visit the website or need to call, etc.; when the user entered the room, computer with "blue eyes" respond, such as the tips of new received an e-mail, if the user shakes his head, the computer consider that the user does not want to read the message.

3.4.2 Gesture Recognition

A gesture is a motion of the body that contains information. Waving goodbye is a gesture. Pressing a key on a keyboard is not a gesture because the motion of a finger on its way to hitting a key is neither observed nor significant. All that matters is which key was pressed.(Mark et al., 1994,2011) The increased rate of touch screens being used today in applications and hardware is growing rapidly and will break new grounds in years to come. This type of new technology requires new ways of discovering inputs from users, which will be made out of screen gestures rather than by the pressing of buttons or the rolling of mouse wheels. Gestures can be done with the movement of face, hands, and other parts of the body. An example of a gesture using fingers is shown in Figure 11 **Error! Reference source not found.** below, where the user is zooming in on an object by using his fingers and moving them across the object. This gesture is also known as pinch-to-zoom¹¹.



Figure 11 shows selection of objects using finger gesture

3.5 Understanding Users

The design of HCI should consider many aspects of human behaviors and needs to be useful. The complexity of the degree of the involvement of a human in interaction with a machine is sometimes invisible compared to the simplicity of the interaction method itself. The interfaces are differing in the degree of complexity both because of the degree of functionality or

¹¹ Pinch-to-zoom can change the size of an object by pinching inwards or outwards of the object - such a gesture can be used for example to create a picture application that allow the user to zoom in or out by pinching the image.

usability. A simple website that may be restricted in functionality should be complex enough in usability to attract and keep customers. (Te'eni et al., 2007)

Therefore, during the design of HCI, the degree of activity that involves a user with a machine should be thoroughly thought. There are three different level of user activity physical, cognitive, and affective. The physical aspect determines the procedure of interaction between human and computer, while on the other hand the cognitive aspect deals with ways that users can understand the system and interact with it. The third affective aspect is a more recent issue and it aims not only to make the interaction a enjoyable experience for the user but also to influence the user in a way that make user continue to use the machine by changing approach and feelings toward the user. (Te'eni et al., 2007)

3.5.1 Mental Model

Mental model is the expectation a user has about a computer's behavior. (Helander et al., 1997) It is what users believe and think about the system when it provided to the user. (Nielsen's, 2010) In general, such models are deeply held internal images of how the world works, images that limit us to familiar ways of thinking and acting. Usually, we are not consciously aware of our mental models or the effects they have on our behavior. (Senge, 1990)

A mental model is based on belief, not on facts. It is a model of what users think familiar about a system such as website. Hopefully, the thinking of the users is nearer to reality because their predictions about the system are based on their mental models. Further, they plan their future actions based on how that model predicts the appropriate course. It's a primary goal for designers to make the user interface communicate the system's basic nature well enough that users form reasonably accurate mental models. (Nielsen's, 2010)

When people are learning and using a system so they develop knowledge of how to use the system and how it works. These two types of knowledge are often referred to as user's mental model. (Preece et al., 2002) Every individual user has its own mental model. A mental model is internal to each user's brain, and different users might construct different mental models of the same user interface. Further, one of usability's big dilemmas is the gap between designers' and users' mental models. Because designers know too much, they form wonderful mental models of their own creations leading them to believe that each feature is easy to understand.

User's mental models of the UI are likely to be somewhat more deficient, making them more likely to make mistakes and find that the design is more difficult to use. (Nielsen's, 2010)

Models are approximations to objects or processes which maintain some essential aspects of the original as shown in Figure 12 below. They are usually considered to be the ways in which people model processes. A mental model synthesizes several steps of a process and organizes them as a unit. A mental model does not have to represent all of the steps which compose the actual process (e.g., the model of a computer program). Indeed, mental models may be incomplete and may even be internally inconsistent. The representation in a mental model is obviously not the same as the real world processes it is modeling. (Helander et al., 1997)

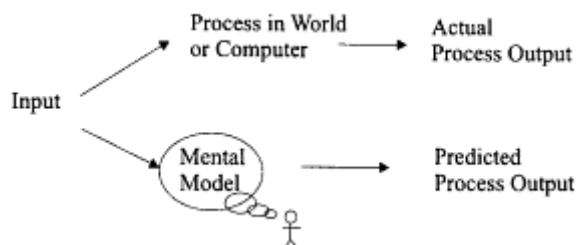


Figure 12 shows process and mental model of that process.

3.5.2 Conceptual model

Mental models are in the user's heads; therefore it is helpful to have models of mental models termed as conceptual models. (Helander et al., 1997) Conceptual model enables users to readily learn a system and use it effectively. (Preece et al., 2002) Metaphor is a class of conceptual model. (Helander et al., 1997)

Metaphor

Metaphor uses the similarity of one process with which a person is familiar to teach that person about a different process, e.g., a filing cabinet for paper records may be used to explain a computer file system. The ways in which a metaphor is incorporated into a mental model are difficult to examine and probably vary greatly from user to user. Moreover, a metaphor can be counterproductive because the metaphor is rarely a perfect match to the actual process and incorrect generalization of the task, e.g., if word processing is introduced by analogy to

typing on paper pages, word-wrapping on the screen makes little sense. (Helander et al., 1997)

3.6 Ubiquitous computing

The major trends of computing used in the world are *Mainframe computing*, *Desktop computing* and *Ubiquitous computing* as show in Figure 13.

Mainframe computing is the first era of computing in which

each pc is shared by many people. Desktop

computing is the second era of the personal computer in which every person has direct access to one pc. Ubiquitous computing is the third wave in computing where one person has access to many computers. (Weiser, 1996) This type of computing is also identified as *Ubicomp* or *Pervasive computing*.

The term Ubicomp is attributed to Mark Weiser. *Ubiquitous computing enhances computer use by making many computers available throughout the physical environment, while making them effectively invisible to the user.* (Weiser, 1993) Mark has a vision of technologies that effectively disappeared. He means that our computers look very similar to our childhood: an invisible foundation that quickly disappears but always remains with us, and is effortlessly used throughout our lives. (Benyon et al., 2005) In fact, the aim of Ubicomp is that products are to be everywhere (portable), to be small and to be aware (about the users, about the environment). Ubiquitous Computing is not to do insignificant tasks by using the computer, but rather, to create a huge infrastructure of computers that will be available to serve human needs.

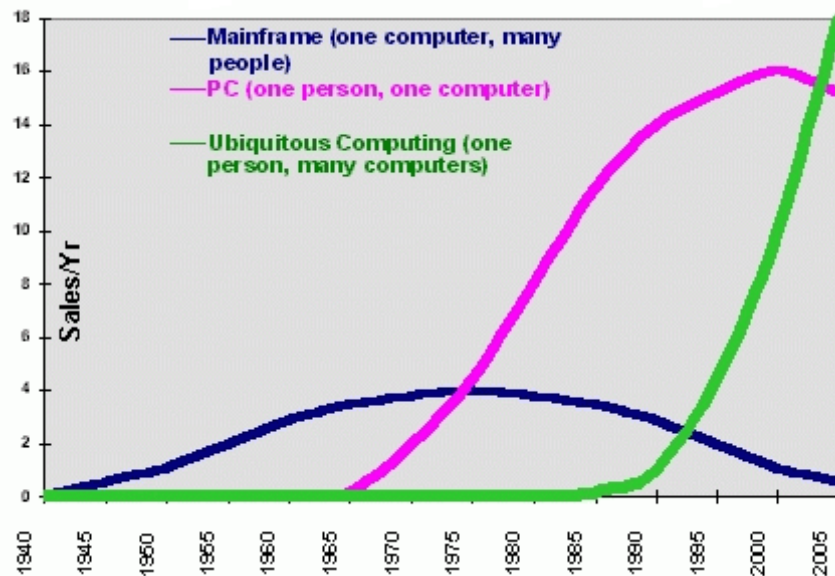


Figure 13 shows major trends of computing

Weiser explained machines and environment as *that fit the human environment, instead of forcing humans to enter theirs, will make using a computer as refreshing as taking a walk in the woods.* (Weiser, 1991) Thus the basis of ubiquitous computing is to provide service at the request of a user and to grasp the intention of a user and situation. A ubiquitous computing device is a device for the ubiquitous service that allows a user to interact with the service anywhere at any time. Also, it grasps the intention of the user and situation to support the user. Ubiquitous devices function in a state where people do not realize that we acquire information about embedded, pervasive, portability and mobility functions; that is, to realize the ubiquitous environment. (Choi et al., 2009)

Ubicomp promises more than just infrastructure, signifying new patterns of interaction themes such as Natural interface and Context-aware computing. (Abowd and Mynatt, 2000)

3.6.1 Natural interfaces

Natural interfaces make an easy and better variety of communication capabilities between humans and computation. Ubicomp requires computers to be able to input information from natural human activity, i.e., a human shouldn't have to explicitly enter data into a computer. The goals of the natural interfaces are to support common forms of human expression and control more of our implicit actions in the world. Previous efforts have focused on speech input and pen input, but these interfaces still do not robustly handle the errors that naturally occur with these systems; also these interfaces are too difficult to build. (Abowd and Mynatt, 2000)

3.6.2 Context-aware computing

Context-aware computing is broader than mobile computing because it concerns mobile people not just mobile computers. These system aims to provide ubiquitous access to information, communication and computation. Three important aspects of context are: where you are, who you are with, and what resources are nearby as shown in Figure 14 below. (Schilit et al., 1994) *Ubicomp applications need to be context-aware, adapting their behavior based on information sensed from the physical and computational environment. Many applications have leveraged simple context, primarily location and identity, but numerous challenges remain in creating reusable representations of context, and in creating more complex context from sensor fusion and activity recognition.* (Abowd and Mynatt, 2000)

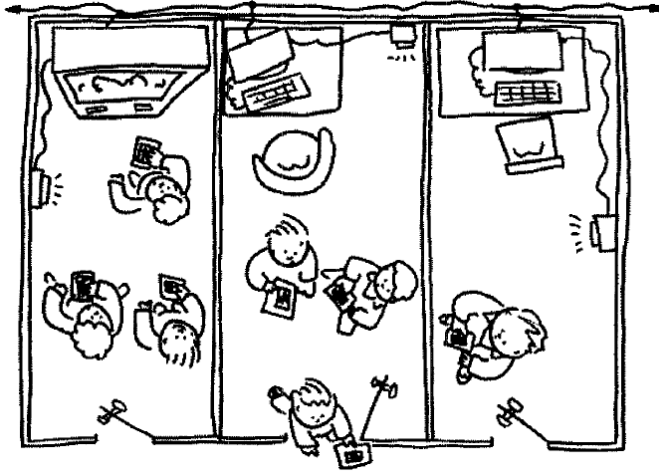


Figure 14 shows a context aware computing system (ParcTab)

3.7 Mobile computing

Mobile Computing is an umbrella term used to describe technologies that enable people to access network services anyplace, anytime, and anywhere. (Jain, 2000) This type of technology allows data transmission through a computer without having to be connected to a fixed physical link. Mobile voice communication is widely established all over the world and has a very rapid increase in the number of subscribers to the various cellular networks over the last few years. The ability of sending and receiving data across these cellular networks is the key principle of the mobile computing. Mobile data communication technology has become very important as it allows users to transmit data from remote locations to other remote or fixed locations. (Gupta, 2008)

3.7.1 Solution to the need for mobile computing

The first solution was to make small computers that could be easily carried. The laptop computer was invented first, and then came the smaller and smaller PDAs¹² (Personal digital assistants) and other handheld devices called mobile devices. As time passes, they become more powerful in processing speed and storage. (Turban et al., 2005)

The second solution was to replace wires with the wireless communication media. (Turban et al., 2005)

¹² PDA is a handheld wireless computer.

The third solution was a combination of the first and second solutions which is to use mobile devices in the wireless environment. (Turban et al., 2005)

3.7.2 Characteristics of mobile computing

There are two characteristics of mobile computing.

Mobility implies portability, which means that users carry a mobile device with them and establish a real time contact with a wireless established system located anywhere.

Broad reach is the second attribute which refers to the fact that in mobile computing people can be reached at any time. Definitely, users can block certain hours or certain messages, but when users carry an open mobile device, they can be reached instantly.(Turban et al., 2005)

3.7.3 Challenges in mobile computing

Wireless and mobile environments bring different challenges to users and service providers when compared to fixed, wired networks. Physical constraints become much more important, such as device weight, battery power, screen size, portability, quality of radio transmission, and error rates. Mobility brings additional uncertainties, as well as opportunities to provide new services and supplementary information to users in the locations where they find themselves. The major challenges in mobile computing are described and include: low bandwidth, high error rate, power restrictions, security, limited capabilities, disconnection, and problems due to client mobility. (Jain, 2000)

4 The case

This chapter will give an overview of the case including all the parties and companies or institutes involved in this research.

4.1 The project

The main library (UB) in the University of Oslo is having a test project where a class of students in the Geology department are given 40 iPads for free as a replacement for the regular syllabus in the paper form. The intention of the library is to get the syllabus more digitalized and available on several handheld platforms and decrease the printing in terms of cost and eco-friendliness. Our project is about finding if the iPad tablet can replace the paper based syllabus, or be an additional feature in the daily study life in terms of reading and writing. We will be collecting data over a period of four months (a semester) by asking questions, interviewing, and observing the students in their classes. In addition, there will be a qualitative focus-group where everyone involved will participate. Theoretically and practical questions and exercises will be conducted within our research area.

4.2 University of Oslo – Geosciences department

The Geosciences department offers two bachelor programs and one master program. It is the largest earth sciences department in Norway. The faculty has 40 professors and associate professors and 140 employees including post-doctoral and Ph. D fellows.

Geosciences are the studies of planet earth with everything from the atmosphere with water, ice, and ocean, to the earth's surface and all the processes that shape it. Some of the keywords for their activities are field work, experimental work, mathematical modeling and geomatics. The course presents and discusses principles of weathering, erosion, transport and deposition, with particular emphasis on allogenic and autogenic factors. Sedimentary facies and paleontological analyzes, sedimentary logging and studies of well logs and seismics will be combined with basic principles of bio- stratigraphy and sedimentology in integrated assessments of depositional environments. (UiO, 2010) The course is called «Depositional environments and biostratigraphy», GEO4220. The students taking this course are master students from the first year. The majority of the 40 students attending this course are from Scandinavia and Asia where the most common age is between 26 and 30 years old.

4.3 University of Oslo – Library

The University library was founded back in 1811 by a royal resolution together with the University itself. Earlier up until 1989 the library was known for being the Norwegian national library. That has changed today.

The library today is a course and research resource for students and the employees of the University of Oslo. It consists of four libraries and a central administrative unit. It is also part of the total educational and vocational package offered at the University of Oslo.

Andrea Gasparini is working for the University library as a chief engineer. He is responsible for our project as well as other digital innovation projects within the library.

The University Library is already using 75% of their procurement budget on digital literature and the proportion is increasing. Along with our project, there is another course called ECON2310 – "Macroeconomic analysis" where the students are offered an eBook reader called Boox on the same purpose level as the iPad tablet. This is also initiated by the University Library. Both of these projects will have the textbook syllabus available in the digital form.

4.4 Case details

This master thesis is involved in the project where the University library is giving out 40 tablets from Apple called iPad to the students of the course GEO4220. The University Library is trying to make the digitalized syllabus available on several handheld devices platforms. Several departments at the University are reporting an increase in the printing of digital syllabus. The initiative of digital syllabus is going in the wrong direction.

In this project, we will try to see if the iPad tablet has the potential to replace all of the common study activities we are familiar with today. That includes reading the paper based textbook with applications that support digitalized syllabus. Annotate in the text using a touch-screen instead of a pen and lastly, to see if the writing can be done with the actual touch-screen that supports software based keyboard as the main input interface.

The students and the lecturer from the course have voluntarily enrolled in this project. All of the students are given an iPad as their main resource where all of the study activities mentioned above are executed.

One of the most challenging parts for the University library is the copyright issue. It has been difficult to gather the entire syllabus from the different authors and make them all available electronically. The business model for these types of distributions is still in the starting phase for many of the authors.

The tablet will cover all of the study activities by having applications that fulfill the user needs, which is, to begin with, read, annotate and write.

The reading application is called iAnnotate and it's purchased using the app-store, which is the application distribution channel by Apple. It's meant for downloading and installing application. The purchases are done using an account which in our case, is filled with 150 NOK. That amount is covering more than the cost of all the applications used in this project. iAnnotate is also used for annotating where you can choose different sizes, colors and thickness of what you would like to highlight in the syllabus. Furthermore, the writing is done by using the built-in on-screen keyboard. You can either embed notes into the text directly, or if the students prefer to write dedicated notes, an application called Elements is provided to them. The application is a text-editor with all of the basic features that allows you to write notes. The application is also integrated with Dropbox, which is a file hosting service that allows you to synchronize and store data up to 2GB for free.

The whole syllabus for the course GEO4220 is available electronically. The source of it is the textbook. The digital syllabus has been literally scanned and thus is a copy of the paper based textbook. It has been downloaded into the iPad tablet by using the Dropbox application. The syllabus in this course consists of 7 PDF files where the pages vary from 30 to 300 pages in total. Each PDF file is indexed and optimized for the iAnnotate application.

The students will have free rein to do whatever they like with the iPad tablet in terms of installation and buying additional applications by the amount provided by the University Library. Having the feature to read, annotate and write notes to your syllabus, the students will also have the opportunity to use tools and applications related to their field. The whole purpose of the project is to see whether the iPad tablet can be useful in a study setting. It is not intended to be coercive, but rather a device that can help the students and enable new ways of learning and studying.

5 Findings

In this chapter, we present the main findings which we have made during observations, questionnaires, interviews and focus group sessions. Every method is used to strengthen the findings from their previous methods, and to discover new and interesting areas to answer our research questions (section 1.4). Results from each method are presented chronologically, and interesting findings are emphasized and further brought into discussion in chapter 6.

5.1 Observation

The observation was done twice during the data gathering period. We used both participant and none participant observation mythology (section 2.2.1).

5.1.1 Non-participant observation result

When the project started, about 40 iPads were handed out to the geology students. This happened in a small library at the University of Oslo. One of the interesting findings on that day was that almost all of the students were precise on the given time, and the hall was almost full for the whole time period as shown in Figure 15. There was a great mixture



Figure 15 shows students waiting in a queue for getting a free iPad

of students with different nationalities and backgrounds. The majority of the students were males. Many of them had a south-east Asian background. All of them were really excited to get an iPad for free for the whole semester. This delivery of the iPad tablet ended up being time consuming due to unseen challenges: everything from registration and creating an iTunes account, to actually get the whole syllabus copied over to the tablet. Because of this, the hand-out was divided into three days.

The first interaction was to start up the iPad. Students, who have not used an iPhone and/or iPad before were facing some difficulties to find the power button for the iPad, while the others had found it.

The second thing we noticed was how they were using the iPad. We saw that the iPad was being held in portrait format and within its packaging box. The keyboard interaction was done with one finger on the screen. There was actually only one student we observed that used both of his hands to write on the iPad. He had it in landscape mode. That student was an iPhone user and he preferred the landscape mode because of a wider screen for input.

Some of them encountered problems during registration when they were using the onscreen keyboard because they were not aware of how to switch between numerical and alphabetic buttons as they are



Figure 16 shows iPad onscreen keyboard. User has to press on the red circle button to switch on alphabetic keyboard, and on the black circle button to switch on numeric keyboard.

invisible as shown in Figure 16. Having said that, most of the students were typing with their forefinger only, which made the typing speed very limited.

Most students did not have an app store account, and they didn't exactly know what the purpose of it was. In addition to this, they did not know how to install the applications on the iPad. We must add that this was a "registration" environment where students were invited to only receive the iPad tablet with its syllabus. All of the students were satisfied by the end of the day since they didn't have to spend money on buying compulsory textbooks and they were eager to get started with their tablet based studies.

5.1.2 Participant observation result

We attended their first lecture class on 28th of October. We wanted to observe the students, and how they were utilizing the iPad in a study use case. The first thing we became aware of where the desks being quite small and inefficient for any tablet or laptop usage. There was hardly any space for both the course book and for taking notes. Also, there was no electrical wall outlet for charging the iPad. We were told that this lecture lasts for about 4-5 hours in this room. The most interesting finding was that only one student was using the iPad out of 28

students who were participating in the lecture. He was using it for reading in addition to the slides. Due to the table being small, the tablet was placed in the corner of the table, with no visible angle when sitting on the chair facing forward.

The lecturer gave the lecture by using slides from a laptop. He didn't use the iPad during teaching, even though he had one available. Almost all of the slides had at least one figure, graph, or some image. It was not very comfortable to look at the lecture slides for those students who sat in the back of the classroom when the slide was full with details. The slides which the lecturer used were not available on the iPads. We think if these slides were made available in addition to the syllabus, it would have given the students sitting back of the classroom a better view. The notes in relation to the slides were being written in their usual paper based notebooks.

During the break, some of the students took out the iPad from their bags and checked email and logged into Facebook, while other were entertaining themselves with games.

Considering this was the first lecture and the reason for probably why the students didn't use their tablets. On the other hand, it gives us feedback that further research is needed in terms doing interviews.

5.2 Questionnaire early stages

We conducted two questionnaire sessions as mentioned in Chapter 2.2.4. The first one was conducted in the beginning of October 2010 which consisted of 43 questions; we received 33 responses out of 40 students. 72.7% of them were male. The majority of them were from Scandinavia, but there were about 33.3% people from Asia also taking this survey.

Experience with touch-screen devices

Half of the students participating in the geology course didn't have any experience using touch-screen based devices before this project. The other 50% had tried out various touch-screen based devices including products from Apple and other manufacturers. Figure 17 below shows the exact percentage of the students who had used, and not used touch-screen

based devices.

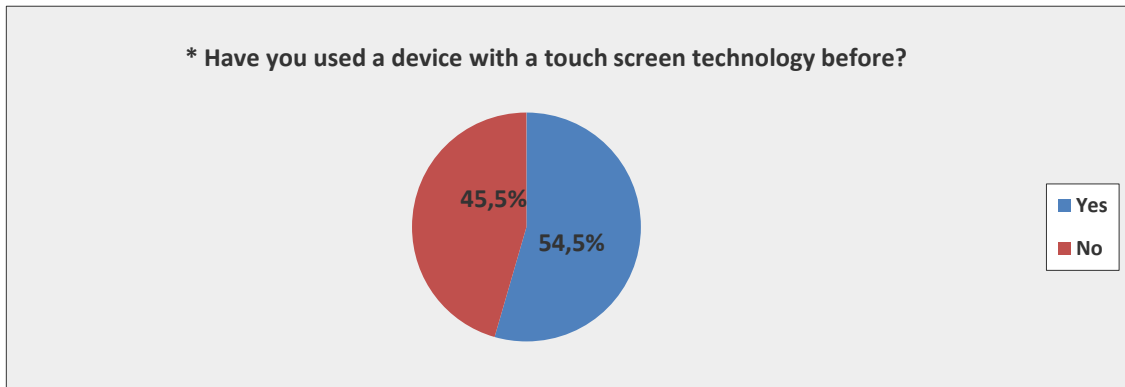


Figure 17 shows a pie chart that 45.5% of the students had not used touch screen devices, but the remaining 54.5% had used touch-screen devices.

Syllabus

From the Figure 18 below, one can see reading of the syllabus was mainly done on the iPad, but with a combination of paper and computer as well. About 70% of the students have reduced printing due to the factor of reading on the iPad.

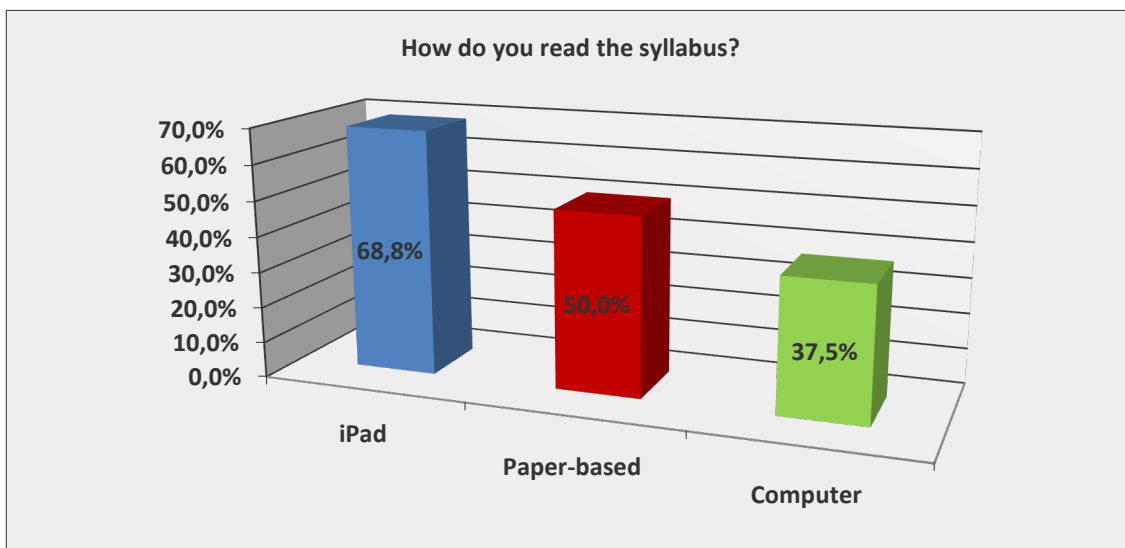


Figure 18 shows how students read syllabus during the course.

Another major finding was that the students were still taking notes by using pen and paper. We assumed before the project begins that people will now make use of iPad but it was not more than 15.6% as shown in the Figure 19 below. This figure means that those students were not just utilizing the iPad but using the paper to take notes.

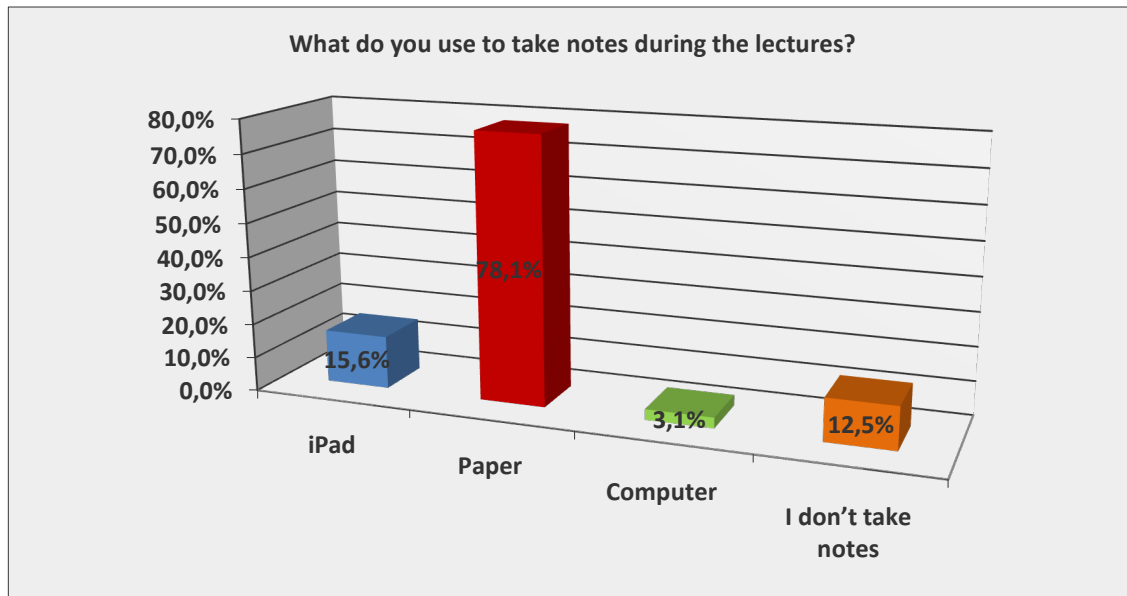


Figure 19 shows pen and paper was mostly used for taking notes by the students.

Experience with iPad

Figure 20 below shows that over 40% of the students were facing difficulties using iPad in the classroom. We saw during the participant observation as well that the classroom was not suited for tablet usage. The students agreed on this point as they confirmed having difficulties using the iPad in the classroom.

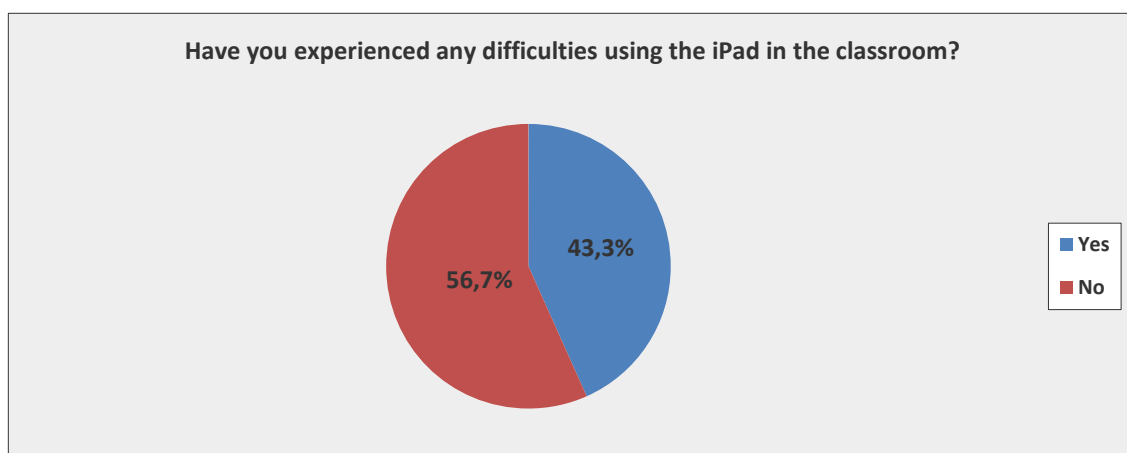


Figure 20 shows how much percentage of students facing difficulties using iPad in the classroom.

One should understand after looking at the Figure 21 below that it is not easy to read on the iPad for a long period of time.

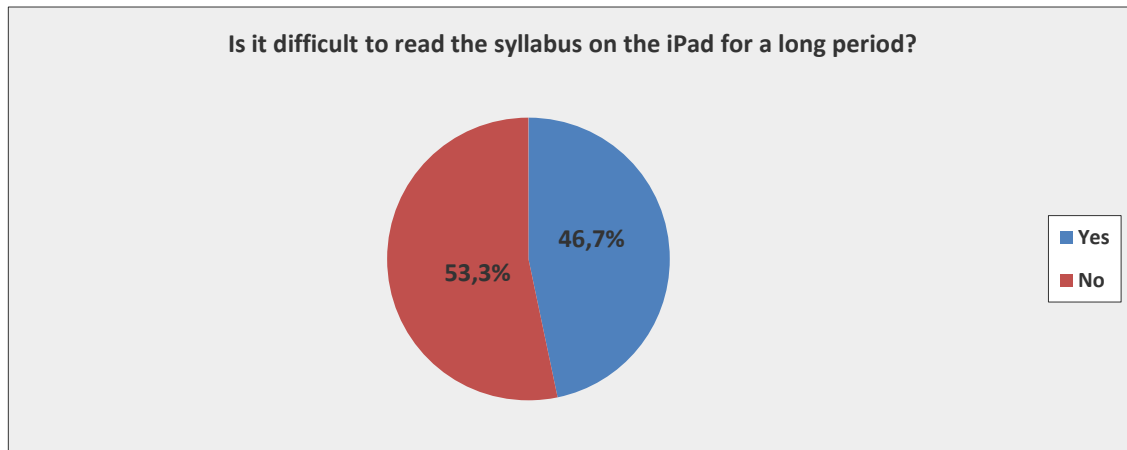


Figure 21 shows the percentage of students facing difficulty reading on the iPad for a long period of time.

The students seemed to like the benefit of replacing something physical and heavy as shown in Figure 22 below. Instead of bringing heavy books in your bag each day, they could just bring the iPad which had all of the syllabus spread in several PDF files. They also mentioned some other benefits as shown in figure 21 below.

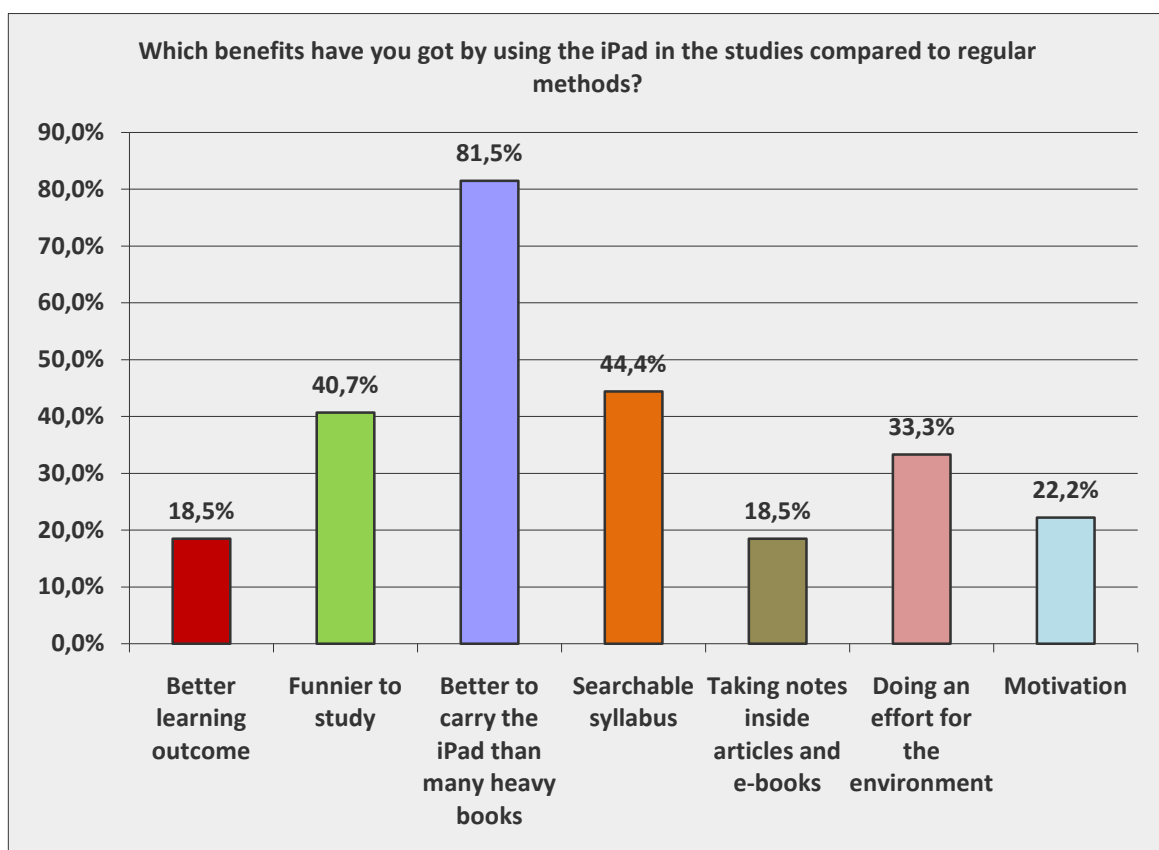


Figure 22 showing the benefits of the iPad.

Experience with iPad applications

iAnnotate was not used for annotating or taking notes by 40% of the students as you can see in the Figure 23 below. It was more or less used for reading only. Paper was the main source for taking notes.

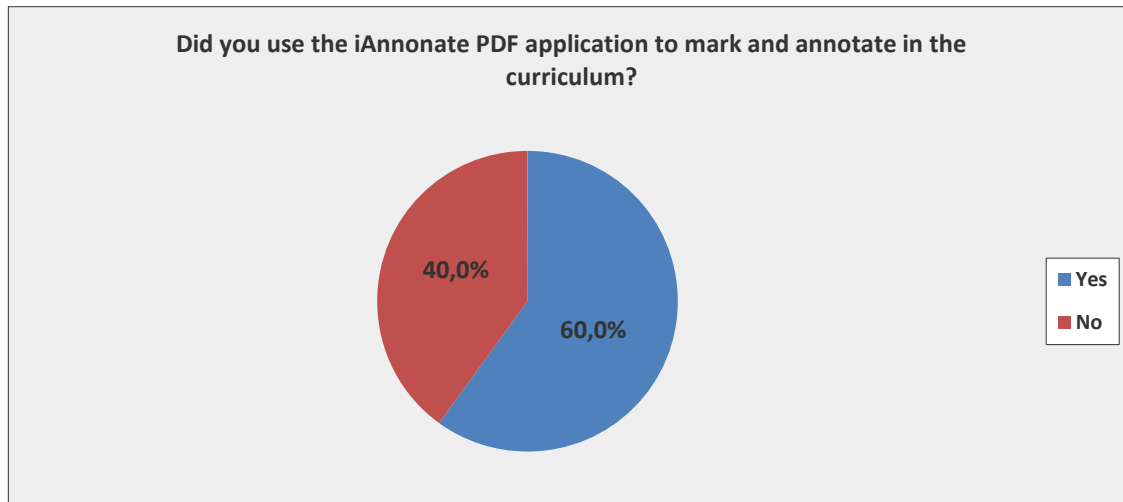


Figure 23 shows 60% of the students has used iAnnotate for annotating the syllabus.

Figure 24 below reveals an important finding that the students after having used iAnnotate for just about one month were searching some other competitor for iAnnotate. This means that they were not fully satisfied with the application.

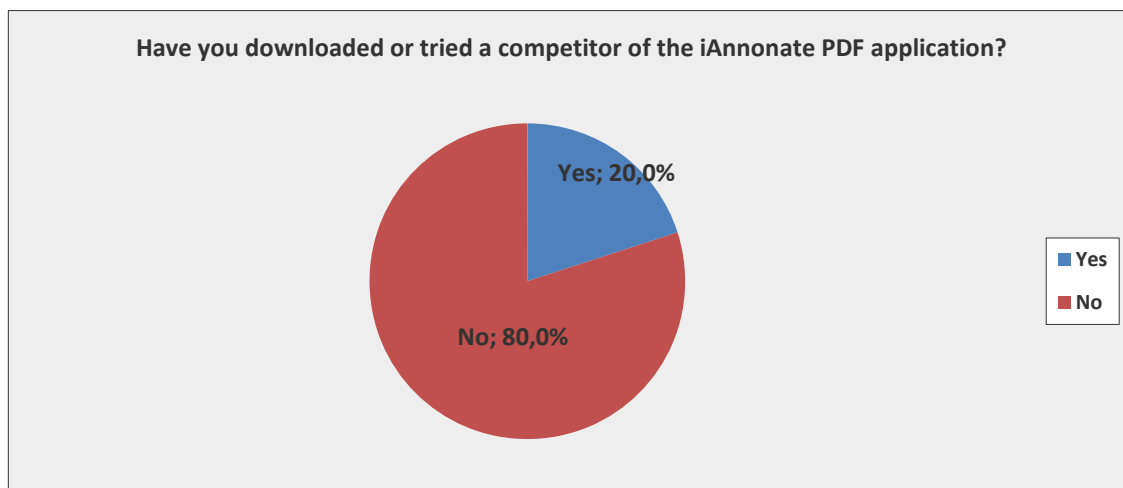


Figure 24 shows that 80% still using iAnnotate but there were some group of people which were looking for iAnnotate challenger.

The tablet device was meant for study purposes, but the students were not restricted from downloading any sort of applications. The result was that 83% of the students had downloaded and tried other applications.

Tutorials

50% of the students did use some sort of tutorials to get started with the study and other iPad related applications.

Entertainment

Almost everyone has used iPad for entertainment except a few. Approximately 40% gave a response that iPad is entertaining for study purposes. Over 40% said that it was entertaining for entertainment purposes.

Collaboration and communication

Over 70% didn't share any notes or data from iAnnotate. The iPad was used during the lab session, and over 70% means that it is useful when it comes to collaborative work in this context. Exactly 60% have used it as a communication device such as chat, email and so on.

Limitation

60% have mentioned that there is some limitation in the syllabus application. It does not open all of the files quickly enough. A USB port is missing on the device to connect and share data easily with other devices. A stylus was also missing for easy writing rather than using the onscreen keyboard.

Concentration

More than 50% said that they could not concentrate on the lectures while using iPad.

5.3 Questionnaire last-stage

The last survey was conducted on 7th December 2010, which was almost at the end of the semester. This was a short questionnaire which consisted of thirteen questions. We received twenty-one responses out of forty.

Notes

Over 71% of the students were still using pen and paper for making notes as shown in Figure 25 below. Over 50% gave the reason that it was not convenient enough with the built in on-screen keyboard. Over 25% said that the writing became too large if they tried to write with a finger. 20% said that the classroom environment was not good enough, and that full iPad equipment was not provided.

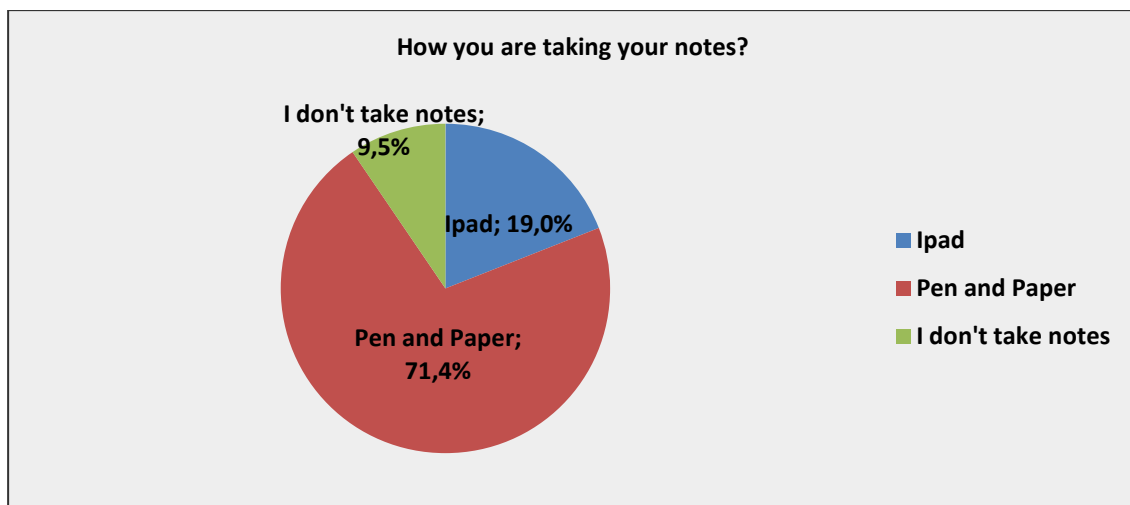


Figure 25 shows how students took notes during the whole semester.

The most preferred user interface on the iPad for taking notes in the classroom turned out to be an external keyboard and a stylus as shown in Figure 26 below.

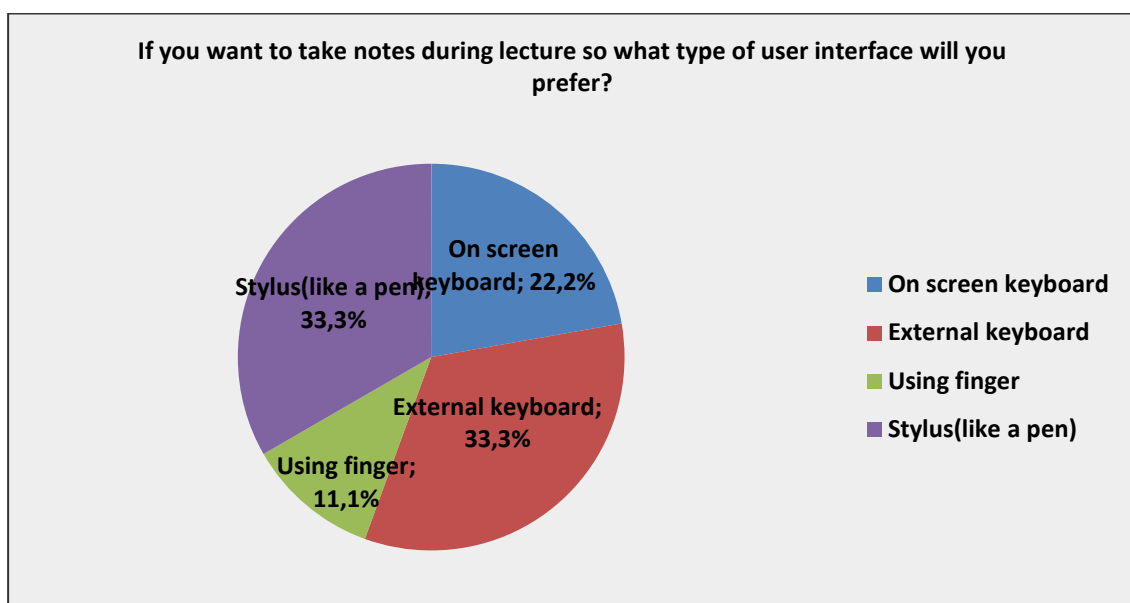


Figure 26 shows the types of user interface which students preferred for the taking of notes.

Reading

Over 50% used both the combination of iPad and books for reading purposes. They explained that the syllabus files took too long to go from one page to another as compared to textbooks. Slightly over 14% used iPad and books separately. Results from Figure 27 below show that a combination of the textbooks and digital syllabus is something that the students prefer, while the others are enthusiastic on trying out new technology.

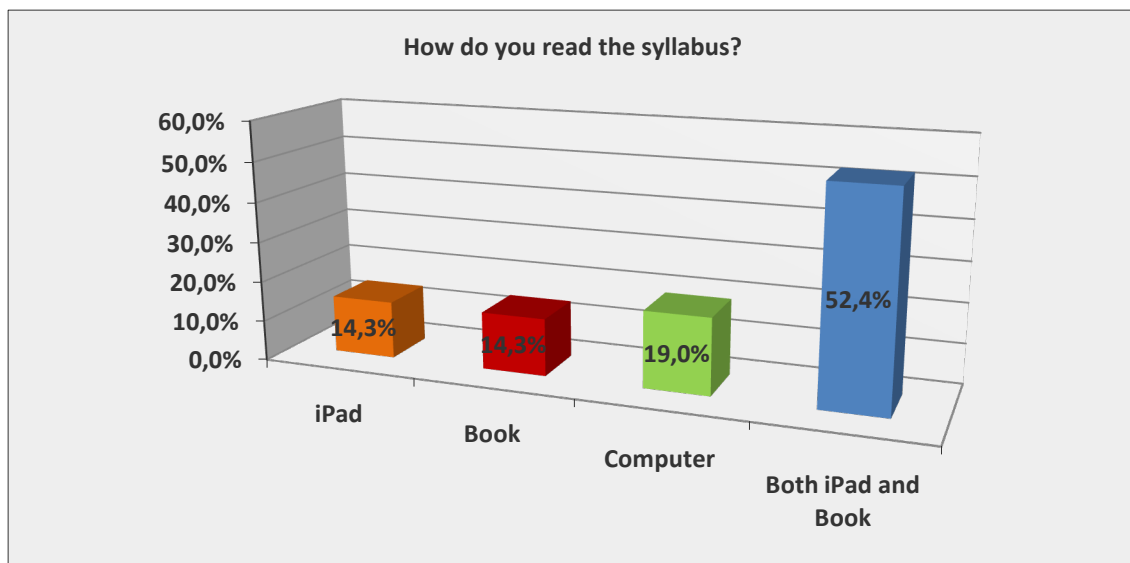


Figure 27 shows the students percentage of reading syllabus via different devices.

Navigation

In regards to navigation, we received responses that conclude navigation in general on the iPad is easy as shown in Figure 28 below. Only 11 % said that they think prefer a stylus together with the on-screen keyboard when it comes to navigation.

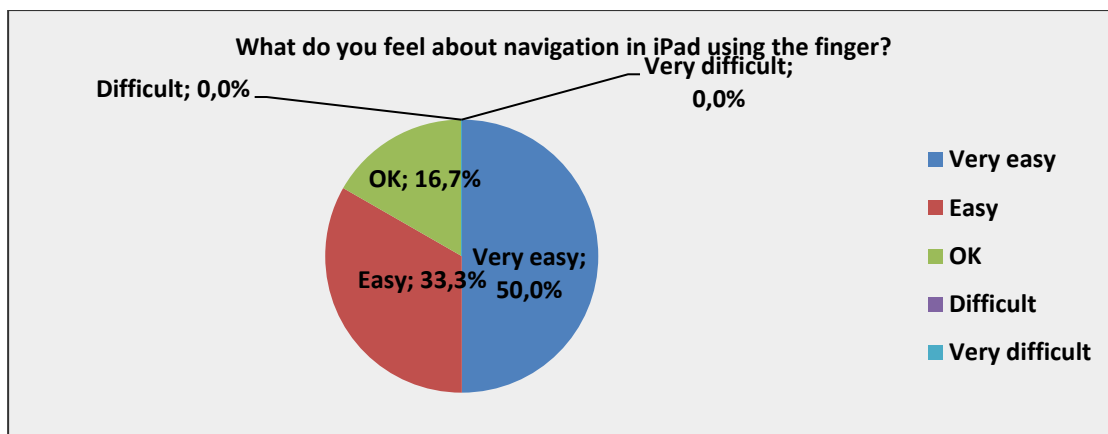


Figure 28 shows that students didn't face any difficulty by navigating with a finger.

Interactive syllabus

Half of the students liked the idea of an interactive syllabus with 3D figures and embedded videos.

Applications

One student pointed out the lack of seeing visual tablet syllabus available in the application instead of using Dropbox and sees the syllabus as "files".

Digitalize syllabus

Over 50% said that they didn't want to read the syllabus on the tablet in the next semester. In another question, over 50% mentioned they wanted to use a combination of books and iPad as shown in Figure 29 below.

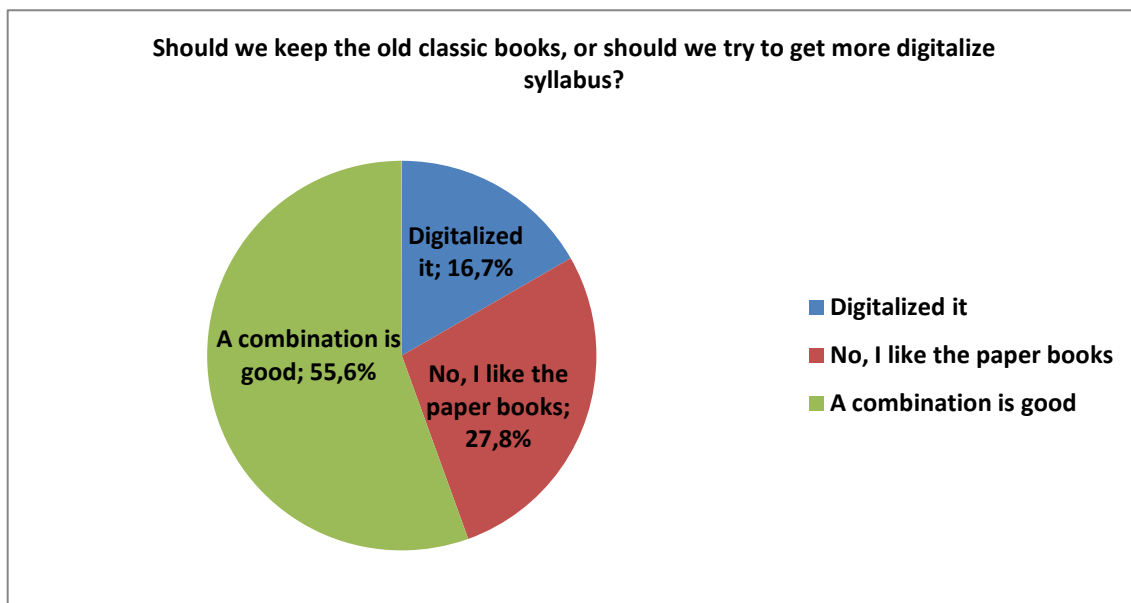


Figure 29 shows the format that the students wanted to use for the syllabus.

5.4 Interviews

We chose five students randomly who were interested in being interviewed. In the beginning, we gave details about the purpose of the interview which was explained in the section 2.2.2.

Further, we gave an indication that it will take between ten to fifteen minutes to complete it. The session was made in a closed room. Most of them gave the opinion that the iAnnotate application was difficult to use and understand. We agreed with them that we will make a tutorial video. We created the tutorial (Qureshi, 2010) after the interview about the use of iAnnotate to help them understand and use this application with their studies. Another issue that we received during the interview was that iPad with the onscreen keyboard was not good enough for making notes. They tried, but it was time consuming and they lost their concentration on the lecture. They ended up dropping making notes on the iPad because of this issue. They believe that the stylus can and will be the closest experience to the pen they are familiar with in order to increase the efficiency and the speed of writing.

Students also raised the point about the classroom environment which was not up to the mark for tablet usage. The chair in Figure 30 below gives an example of the classroom environment where students were not able to keep an iPad on the desk.



Figure 30 shows the classroom chairs used for iPad usage.

We also raised a question about what we observed during the lecture that only one student was using the iPad. We received a response that they haven't gotten the lecture slides copied on to the tablet and only the syllabus. This is why they didn't use the iPad in their classroom. We informed the University Library about it after the interview.

We also talked about why the students wanted to combine textbooks and iPad for reading. The reason for it was the lack of effectiveness on the PDF files. All of them were performing slowly, it took time to go from one page to another. The students thought the performance of the iPad was the issue, but it wasn't since we tried ourselves with a different PDF file with

400 pages. Navigation between and loading time was not an issue at all. We informed the University Library about this issue as well.

5.5 Focus group

This session of feedback and questions were asked in a closed meeting room around a round table and it took 1 hour. Our focus group consisted of four students. We started with an introduction where everyone told their names and got to know each other a little bit. Notice that this focus group was conducted almost at the end of the semester, which should reflect the results in terms of usage and experience with the iPad better than other data collection used previously in the semester. The data gathered for this focus group were transcribed and divided among the parties involved to be tabulated in order to get an overview and conclusion of the session.

Syllabus

The majority of the students did answer that they use the iPad together with other study materials like textbooks, pen, and paper. They said it's difficult to just switch when you have 20 years of experience using something that you know works well. Combination is the key here. They enjoy using the iPad during the exercises since it is fun to interact with, and quite easy to share information among each other.

Another interesting finding is that most of the students will still prefer to have regular books since they are in the habit of using them. Meanwhile, they are positive about using the iPad, but not with today's look and feel. A stylus and an application where it is actually possible to take notes and follow slides from the lecturer is a must.

Further on, we confirmed that printing was highly reduced because of the iPad usage. Most of the students said it was convenient to read the syllabus on the tablet instead of printing them.

Challenges

The main challenge was to take notes on the iPad during the lecture. It was difficult to follow the professor since he was going fast with his slides. Some of the students did experience difficulties following the speed of the professor and writing on the onscreen keyboard. The notes that the students wrote, contained a mixture of drawings and text. The iAnnotate

application wasn't really suited for notes where you can draw different figures and graphs. As mentioned earlier, there were some issues in the PDF files being slow on loading time. The students had to wait between 2-10 seconds for each page to open up. This was corrected in the middle of the project though. The PDF files were optimized to work for the iAnnotate application, but still there were some slowness. This factor also impacted the decision of not using the iPad in the lecture. iAnnotate was mainly used for reading the syllabus. They used several functions while reading such as page navigation, and search.

Interactive syllabus

In this project, we gave the students PDF files presented in an annotation application called iAnnotate. This approach is an adaption from regular desktop and laptop computers. There is no big difference between this study method and the iPad, except for the touch-screen and the user interface. We are providing the students with the same old syllabus, scanned into PDF files and then presented on a tablet with a touch-screen. One of the major findings was the interest in changing the way the syllabus is today by using the iPad hardware and software's potential and making it more interactive.

We showed the students an example of how interactive a syllabus can be. We used the WIRED application from the app-store and presented one magazine with its embedded video and rotating figures. The students liked the idea of having such a syllabus for learning. They told us that 3D rotating mountains is something they would prefer in their field. Videos and the whole magazine experience is something they would also prefer over textbooks syllabus. Some of the students also gave us suggestions on how they think it can be made, one suggested having a short multiple choice tests after each chapter to confirm and refresh the memory of what you read. Others said they would like to have hyperlinks, videos, and 3D figures included in the syllabus in order to get more detailed information. They also mentioned that social networks combined with study should be included in order to use the technology of the tablet.

6 Analysis and discussion

1) How can iPad change the way people study today?

Today, typical studies are mostly done by reading textbooks and writing notes on paper. The paper has existed since the 2nd century. It is a known material and has been used by generations of people. It is quite challenging to switch the mental model of the students and demand them to use digital technology.

The University of Oslo Library uses about 75% of their procurement budget on electronic literature, and the proportion is increasing. (NIPEN, 2010) We do believe this will increase in other distributional channels and libraries in the future.

The iPad has the potential to change the way we study today and set some new boundaries between study methods and tablet use. We think it can either be a supplement to textbooks like computers, laptops, and handheld devices are or it can replace them all by being the primary study device.

So how can we say a tablet has the potential to change us as we study today? Well, in our case, the iPad got a 9.7" IPS¹³ LCD capacitive multi-touch screen which is responsive and let users easily read content. The screen's depth and the ability to pinch-to-zoom on each object give the user a better overview of the content. (Apple, 2010) The battery lasts for about ten hours with regular usage, and its weight being 680 grams makes it portable. iPad type hardware is probably found in several tablets available in the market today, but the interaction design of the GUI together with the applications providing a satisfying user experience makes the iPad inventive in the market today. (McCracken, 2010)

Our empirical study is showing that the tablet is providing an appealing user interface for the students. Less than 50% have not used the touch user interface before and the 25% of the remaining users had barely tried it, but our findings shows that they find it easy to accomplish their task of tablet use in academic context, such as reading, annotating and navigating within the iAnnotate application. *"Usability is quality attribute that assesses how easy user interface are to use"*. (Nielsen, 2003) The motivation to use it is high compared to an e-book reader

¹³ IPS (in-plane switching) was developed by Hitachi Ltd. in 1996 to improve on the poor viewing angle and the poor color reproduction. It is designed to show off everything in portrait and landscape. It has a wide, 178° viewing angle due to which someone sitting next to you gets a brilliant view.

called Boox, which was used simultaneously in a parallel empirical study at University of Oslo. (Trond Arne Nygaard, 2010)

In our case, we had two applications that were reflecting on the mental model set of the students. iAnnotate for reading PDF files in terms of textbooks and Elements for writing notes in terms of notebooks. The iAnnotate application was replacing the textbooks by providing a GUI designed for interaction with PDF files. The PDF files, which are the syllabus, were copied manually into each tablet during the setup process. Each PDF file replicated a scanned textbook where the pages varied from 30 to 300 pages. The application is not meant for reading PDF files only, it also provides a complete annotation system which lets you mark and highlight different words and sentences in the document as the student does with a pen today. Reading itself doesn't require high usability, but it requires a platform which takes care of usability in terms of navigation, search, and feedback. According to our findings, iAnnotate covers the elements mentioned above. The other application called Elements is a simplistic text editor where the main purpose is to create, view, and edit text files. It provides integrated syncing with the Dropbox sharing service. The input method uses the on-screen keyboard as default, but this can be switched to an external physical keyboard for those who don't like the touch-screen typing experience. By providing these two applications with optimized PDF files for reading, and several user interfaces for writing like a stylus and an external keyboard, we believe the iPad can satisfy a regular student's need and thus change the way we study today.

2) What are the main challenges for the students in terms of usability and affordance to adapt a tablet technology over pen and paper?

We've seen that an old communication method such as regular mail has almost been replaced by electronic mail. The same thing is happening in the entertainment sector when it comes to music and videos. CD and video shops have been closed and then reopened on the web with integrated streaming solutions, such as Spotify¹⁴ and Netflix. The same pattern is repeating itself for e-books where a company named Amazon is taking the lead with their eBook solution. All of these integrations of new technology have had challenges in terms of usability and affordance.

¹⁴ Spotify is a music streaming service and application software from a Swedish based company. It allows instant listening to specific tracks or albums, with virtually no buffering delay.

Our empirical study shows that usability is the most important factor when adapting the tablet technology, especially in an educational context. The motivation and fun factor is different compared to systems that are optional to use, such as gaming and entertainment environment. We are reaching towards the students and involving them to use preselected academic applications with their features for reading syllabus and writing notes.

We have to understand that the people don't like to use time on learning how a new system works. If any complexity occurs, users look for other competing products. (Preece et al., 2002) A usability challenge occurred when the syllabus was placed on the iPad. The students did not know how the Dropbox functionality within iAnnotate, where the whole syllabus is placed, was being used. In our case, the UiO Library was the responsible part for updating the syllabus. This was an administrative task and not related to the students to begin with. That changed later due to the PDF files being slow and some of the chapters inside the syllabus were missing. In order to update the files, the students had to do a sequence of different processes in order to get an updated syllabus. Such a task required the understanding and experience of the Dropbox sharing technology and how that is being exported into a single shared folder. This task also challenged the memorability of each user, especially since the task was originally executed on the registration day of the iPad by the administration.

Another important matter is about the slowness and navigation of the syllabus files. This issue got confirmed in all of our data-gathering methods where the efficiency of the syllabus got decreased. The affordance of the paper syllabus did not get replicated into the tablet syllabus in terms of sliding between pages, thus the experience was poor and not usable in the beginning, but performance wise it got updated three times where the slowness got improved and the content got updated. In the world of touch-screen based devices, our interactions are much closer to our actions in the physical world. We have seen other applications on the iPad adapting gestures that are closer to our real life actions. Such as turning a page in an eBook and actually seeing the page flick over seems consistent when using a natural gesture like flicking a finger across the screen. Flicking downwards or upwards gives you a wrong imitation of the physical action, thus resulting in lack of gesture recognition and navigation. The consequence of this happening resulted in that some users bought/borrowed physically books to compensate the lack of efficiency and navigation.

The learnability for the iPad should not be taken for granted because half of our students didn't have any experience using a touch-screen user interface before. It takes time to learn a

new technology and use it on a daily basis for education purpose. There are different types of students involved in our case, e.g. young, old, intelligent and slow learner which has different conceptions and mental models about their interaction. We cannot ignore the cultural and national differences which are very much in our case. In fact they have different ways of learning, understanding and skills. Preferences of the users changes gradually when they become expert in new user-interfaces. This challenge is what we call the adaption period, and it can vary from minutes to days depending on the complexity of the phenomena.

The learnability process in our case had several stages. To begin with, it was to know how the tablet works, everything from starting the device and connecting to the Internet, and then exploring the possibilities with millions of applications in the App store. Secondly, learning the application where the entire syllabus is stored, understanding the features, document structure, updating process, and what's needed to start using it. Third, is aware of how to write efficient notes that includes all the possible user interfaces for input. The third adaption stage was a bit challenging for some of the students. All of the students did have experience using pen and paper to write notes, which we all agree and is the most natural way of writing notes. Some even had laptop experience for taking notes. That's perhaps fast, but more restricted in terms of drawing and connecting different paragraphs and sections to each other in a text editor compared to a piece of paper. The third adaption stage was quickly ended. The main reason for it was the lack of an efficient on-screen keyboard experience which we get from our findings. The on-screen keyboard is an artifact which provides affordance. The users are not in any doubt about it. The problem as we see it is the touch screen user interface trying to adapt the same efficiency as the physical keyboard by using click sounds without getting the same keyboard experience. To some extent, it is like having a remote control with a touch-screen interface. You would like to turn the volume louder, but cannot without looking at the remote to see where the buttons are placed. The key-mapping is of course different from model to model and you will most likely remember where the volume button is placed over time, even though you don't have a physical relation to it. The students didn't really get up to speed on the typing, thus they ended up using a pen which they know works efficiently on a paper. According to our survey results, they would have chosen a stylus or an external keyboard if that was an option for the iPad.

Another challenge is the safety in preselected application (iAnnotate). Safety involves protecting both the users and the data. (Preece et al., 2002) If the interaction design in the

application hasn't considered safety, you will end up having a system that executes commands accidentally on the users input. That can occur if the window area you pressed at was too small, or that you pressed the wrong button unintentionally since it was close to another one. We saw that the document management system in iAnnotate confused some of the students, especially those with thick fingers. The folders were literally stacked upon each other, and you would have to use your forefinger to navigate between different documents. That was changed later when a new version of application released, where the whole document management system was changed with a better interaction design.

Further on, a different challenge is the lack of perceived affordance in the applications on the iPad. This factor is especially valid for applications where educational interaction occurs. Many developers assume the users know where to tap to find all of the functionalities. Sometimes the icons don't apply affordance, which leads to a user not being aware of what the function exactly does before pressing it. Sometimes, you don't even know about the controls since they are hidden. You would have to tap a certain element on the screen in order to activate the feature as shown in **Error! Reference source not found.**. This is an example of a false affordance which suggest a mismatch between users' perception and the allowable actions on the interface itself. (Perry et al., 2011)

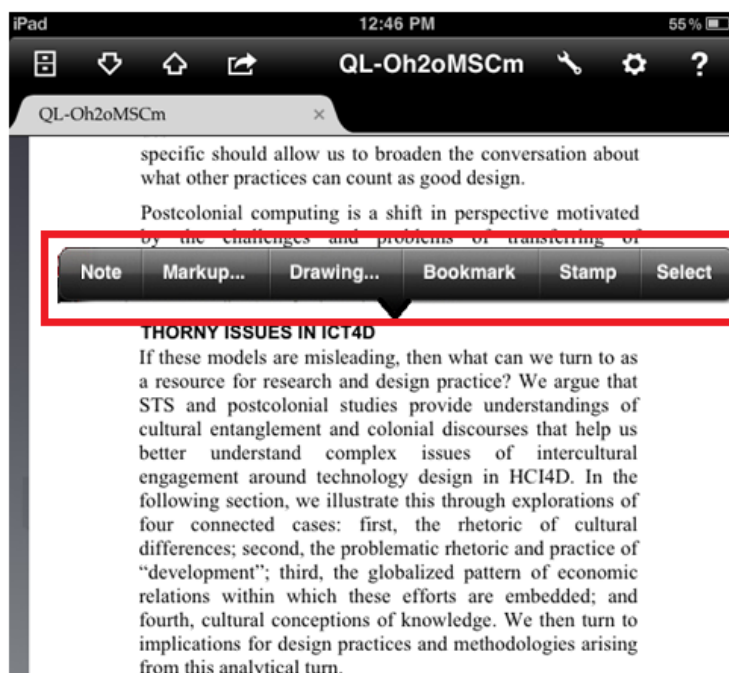


Figure 31 shows the hidden context menu in iAnnotate. It only gets activated if you tap and hold for more than 2 seconds.

3) What are the advantages and disadvantages of using tablet technology over pen and paper?

Advantages:

There are a few advantages when using the iPad with a touch-screen based technology over pen and paper. One of the advantages that our empirical study shows is the weight of the iPad versus several books that you physically need to carry. It enables the whole syllabus to be stored in a single folder instead of carry different books in your bag. The form, shape and the weight of the paper based textbooks restricts its portability and mobility compared to tablets which can bring a certain amount of digitalized textbooks before the storage gets full.

The tablet syllabus in our case is searchable by any words compared to a book where you must look up predefined keywords in the index page, and then go to the actual page. This advantage gives another dimension of the same syllabus. Instead of going through multiple textbooks to find the topic you're looking for, it is possible to search for a keyword in multiple PDF files at once.

Another advantage which the students didn't directly use was the sharing and storage service called Dropbox. Dropbox was integrated in the iAnnotate application where a folder was created to distribute the whole syllabus to all the students by the University library.

Each user created their own Dropbox account to mainly use it for taking notes in the application, Elements. Dropbox supports various platforms, which means the notes were available on their PCs and other devices, and not only on the iPad. The notes could also be shared with others easily. In this case, the paper is more restrictive in terms of sharing.

What you do not get in a textbook is the ability to write embedded notes directly into a PDF file. The whole note gets placed next to the highlighted text and it is formed as a small icon. It works like a post-it note more or less. You can minimize it, edit or delete it at a later stage. We cannot imagine doing the same in our textbooks. First, we don't have space for it and second, nobody wants to buy a textbook filled with your personal notes.

Tablet use isn't restricted to learning purposes only. It's covering many different activities that we are already doing with other devices. Entertainment and social media is one of them. It is connected to the Web, and you have your educational environment with you at all times.

The students used the tablet rapidly when they collaborated on different topics in the lab class. The reason for it was that it was easier to zoom in on figures and share articles that were found on the Web in relation to the subject they were reading about. They shared “portable” thoughts to fellow students by showing the actual tablet screen to each other. That’s almost similar to showing a textbook with some pictures, but the difference is that you can zoom in and show more pictures from the Web and also get related articles.

Disadvantages:

The disadvantage the iPad got over pen is first of all the input type. The iPad doesn’t come with a pen or a stylus. The only way to interact with the iPad is using the touch-screen user interface and the buttons. The default option is to use the onscreen keyboard which is a simulation of a real keyboard. The keyboard experience of typing isn’t the same as a physical keyboard as mentioned earlier. The efficiency of a pen is much better than the on-screen keyboard. In our empirical study, 71% of the students did use pen and paper to write notes. Almost all of the students wanted to use a stylus or an external keyboard during class, when the lecturer was going through slides where graphs and drawings were explained in addition to the regular text.

A book is very simple, it consists of paper and will last as long you take care of it. The iPad needs to get charged regularly. Battery life does not last long, and will be discharged within 10 hours of regular use of surfing the web, watching videos and listening to music. It will probably last longer when you only use it for reading a book which doesn’t involve any network connectivity.

Another disadvantage is the adaption and learnability period of the end-user. It takes time before you can start using an iPad fully in a university environment, especially when you have experienced using pen and paper since kindergarten. A textbook doesn’t require that. The mental model of the students tells them how to open the book and use the table of contents to navigate. The process on the iPad is somehow equal, but it takes time before you can shuffle between the syllabus, and efficiently make annotations and write notes within the iAnnotate application. The adaption time varies from person to person. Also, our focus group study showed that students found it more convenient to use textbooks instead of using iAnnotate when it comes to shuffling between several books. That use case was a bit difficult to achieve using the iAnnotate application with its tab feature which is similar to a tab in web browsers.

Depending on the screen type, a tablet screen's visibility can sometimes be limited in daylight compared to a regular book. Some students like to study outdoors during the summer and others do field work outside in the real world.

The concentration factor is also important when you have several books opened in either iAnnotate or at your table. The activities and use cases that a tablet provides are not meant for studies only. Some students reported that they use social media during a lecture. We think that a tablet has the potential to divert the student from its purpose because of the entertainment factor of the device. A Facebook update, email, or a push notification from a game score can distract the student. A book itself has less activities and use cases when compared to a tablet.

Multitasking is a challenge and can sometimes be a disadvantage. A regular textbook and a notebook to take notes, compared to having a tablet doing both, can be challenging depending on the interaction design of the application. In our case, we had two applications which the students had to interact with. Our findings show that the students are demanding a more efficient way of switching between reading and writing notes as compared to what the iPad is offering today.

The usage of a tablet over a certain time period is limited. You cannot use it like a regular book and read for several hours. Our finding shows that some of the students reported tiredness after more than 3 hours of constant usage depending on the screen type.

4) How can we make the tablet syllabus interactive and innovative for study purpose?

The syllabus used on a tablet today is taken straight from a book. It has either been scanned or converted to a digital format. There is no interactivity involved. We believe the potential of a multi-touch tablet with its computing power in a study setting isn't being exploited today.

The focus is on utilities and features and what they can do with the current syllabus.

If we create a new era that uses the tablet technology and computing power to stimulate new ways of learning, we think it will change how students learn today.

In our empirical study, we had a focus group where we carried out practical exercises in relation to the applications used in the project. One of the practical exercises involved was how we can improve their current syllabus. The interesting finding we made was how motivated the students were to come up with ideas and create new ways of learning. We

showed the students the WIRED magazine application for iPad. In the demo magazine there were embedded videos and 3D rotating figures (fig 5, 6). The students navigated, read articles, and explored the magazine for ten minutes. After that, we discussed the creation of new interaction forms. We asked them if they could think of such a syllabus, where rich multimedia is embedded into it such as rotating 3D figures and embedded videos. The students liked the rotating figures idea because of the ability to see objects from several angles which is important in their geosciences field. Video was mentioned not as a requirement, but as an additional feature which can show a different perspective compared to plain text. A student came up with the idea of having multiple choice tests integrated into each chapter for summarizing and remembering the content. Hyperlinks and social networks were also discussed where links could expand the syllabus with related articles. Social networks could turn into learning networks where students collaborate with each other's by sharing knowledge and commenting on articles. The benefit of such functionality will be that a student can ask a question and get an answer from a friend that is reading the same chapter.

We believe that rich multimedia content can improve how you learn and give the current syllabus a new dimension by using 3D figures, embedded videos, hyperlinks with built-in browsing and social media. Some screenshots of the WIRED magazine can be found in the Figure 32 and Figure 33 below.

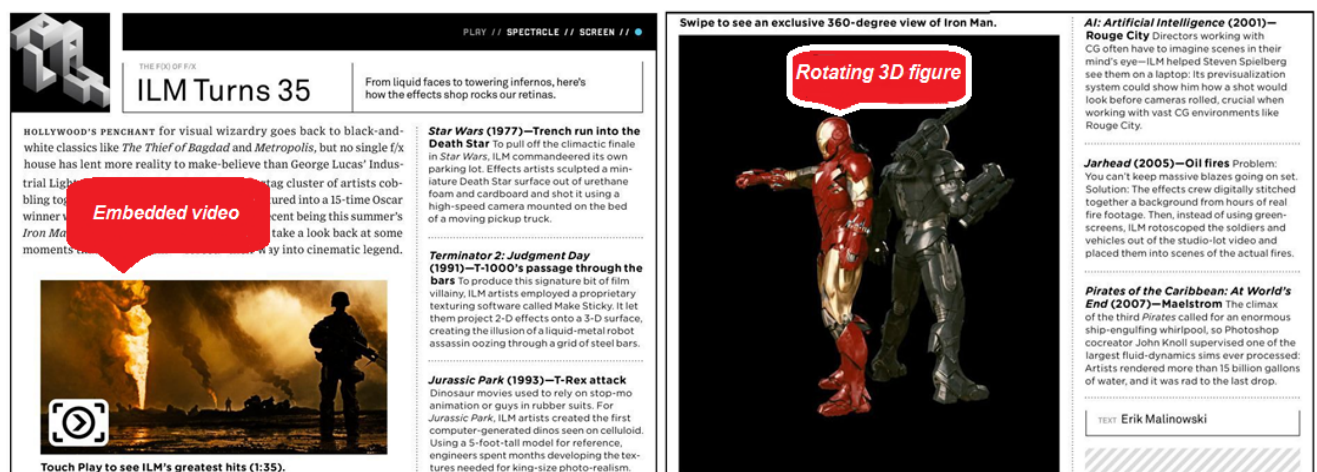


Figure 33 shows the embedded video link.

Figure 32 shows the rotation of the 3D figure

Helander defines mental model as the expectation a user has about a computer's behavior. (Helander et al., 1997) In the WIRED magazine the navigation was not that intuitive from an educational syllabus point of view. It was following the mental model of how you read a

magazine on the web. The students did not quickly understand this way of navigation. The reason perhaps was that they thought it will have gestures that apply the conceptual model of a textbook. Nielsen is referring to a usability dilemma where the gap between a designer and a user mental model is so different that the system created ends up being deficient and difficult to use (Nielsen's, 2010). We think this statement is valid, especially when using gestures. The gestures that are being used for a specific activity should have consistency with what other platforms and applications are using for the same activity. If gestures are not recognized, we will end up having a syllabus which oppose interactivity and creates misunderstanding in terms of different conceptual models.

In order to make the syllabus innovative, we would like to suggest a platform for study purposes which covers all of the use cases that involves a student. This includes everything from taking notes with a stylus, doing annotations, reading and sharing articles, and the most important feature of reading the syllabus with additional artifacts like videos, rotating 3D figures, and an integrated social network.

5) Develop success criteria for incorporating a syllabus on a tablet in a learning environment?

It's hard to predict if we will stop using paper based books in the future. This depends on how the market and technology develop towards helping the current study environment. We will explain guidelines from our empirical study that we think are valid in order to successfully incorporate syllabus on a tablet where the focus is on the student's needs and requirements.

Interactive design and NUI (Natural user interface)

In our project, we have seen that usability must get the highest priority. Nielsen is referring to usability and saying it's all about simplifying and getting the most advanced task as simple and as natural as possible. (Nielsen, 2003) This factor is very important, especially on touch-screen based tablet devices where a finger is the main interaction form.

NUI (Natural user interface) is an emerging computer interaction methodology which focuses on human abilities such as touch, vision, voice, motion and higher cognitive functions such as expression, perception and recall. It seeks to harness the power of a much wider breadth of communication modalities which leverage skills people gain through traditional physical interaction. (Weiyuan, 2010) Most of the gesture interaction for read and write applications

on a NUI based tablet are done with a finger today where the user interface is touch-screen based. The finger is being used to interact instead of using buttons on the tablet. Thus, the user experience depends upon the simplicity of an advanced interaction design. The size of a finger cannot be compared to the accuracy of a mouse click, thus the effectiveness of the NUI and the GUI can be affected if this isn't considered in the interaction design process. The interaction design of the iAnnotate application was a desktop metaphor in our project. When the update of the application was released, the whole document management window was totally changed as mentioned in question 2. It became easier to administrate all of the documents with a finger and the efficiency increased. It went from being a very simple file listing scheme to a user and touch screen friendly scheme that provides better affordance as you can see in the Figure 34 and Figure 35 below. The memorability also increased after the update. The whole menu of document management went from being a small window based design to a centralized page with all the utilities available with colorful and visible icons that applies affordance. It should not be difficult to find utilities and navigate within the application.

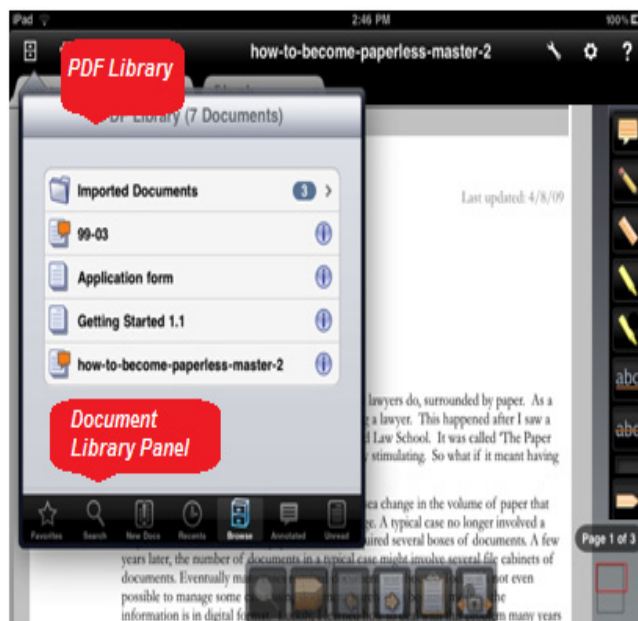


Figure 34 shows the old iAnnotate PDF library.



Figure 35 shows the new iAnnotate PDF library.

Gesture recognition

A gesture is a motion of the body that contains information. Waving goodbye is a gesture. Pressing a key on a keyboard is not a gesture because the motion of a finger on its way to hitting a key is neither observed nor significant. All that matters is which key was pressed. (Mark et al., 1994,2011) The iPad tablet is allowing the expression of NUI interactions with its touch-screen. Gestures come with it and have gotten a significant role in the usability of the NUI enabled applications. The importance of using recognized gestures that are known on the platform-level or that relates to our physical world is also important. An example which involves physically gesture will be the gesture to slide pictures. That is done by flicking the picture on the screen to either left or right, like we do with our pages albums. The students pointed out the flicking of the pages in iAnnotate having the same gesture as scrolling a page horizontally on a desktop computer. A textbook acts differently, and the gesture should be more equal to our physical actions.

Satisfaction and Efficiency

The goal of interaction design in general, apart from improving efficiency and productivity, is to create a design that focuses on the satisfaction of the user. (Preece et al., 2002) The students in our project were not satisfied with the performance of the syllabus being used, mostly because efficiency was lacking in terms of scrolling and page loading time. That's why a few of the students ended up buying paper based books. We think the interaction design for educational purpose should have its focus on motivation, satisfaction, and how helpful the design can be towards the user's goal, which in this case is to learn the syllabus.

Utility

It must be simple to write notes. This activity should be included in the same application as where the reading is taking place. Lack of utilities of the user requirements should be avoided and not be diverted into several applications. Multitasking between applications is not the answer due to concentration being diverted, thus one application for all of the use-cases is preferable. There should be a possibility to embed notes into text so it can be found in the right context. Writing must be optimized for a stylus in addition to the on-screen keyboard.

Safety

There should be functionality within the application that assures the data does not disappear, e.g., notes and syllabus if you lose your iPad. In our case, the iAnnotate application was integrated with the online storage and sharing service, Dropbox, which is assuring data safety.

Accessibility

Some students indicated they used the zoom functionality to look at figures and text. They also mentioned that font size couldn't be changed because the PDF didn't support it. Font size and colors should be adjustable. Zoom functionality should be available with either native gesture from the platform such as pinch-to-zoom, or as an additional feature in the application.

Distribution

Update functionality should be integrated to enable corrections, adjustment, and updates to the syllabus. A distribution channel should be considered. That will be a benefit for the publisher and the students. In our study, the PDF files were updated three times. Our updating process was manual, accomplished by logging into a shared folder from Dropbox, and then downloading all of the updates and new files. The idea is to have a distribution channel where the entire syllabus is available online, and where updates and corrections can be published.

The iBooks application for iPad as shown in Figure 36 is providing eBooks in the distribution solution called iBookstore as shown in Figure 37. It is a place where you can purchase or download free eBooks. This is a visual example of how syllabus books can be distributed.

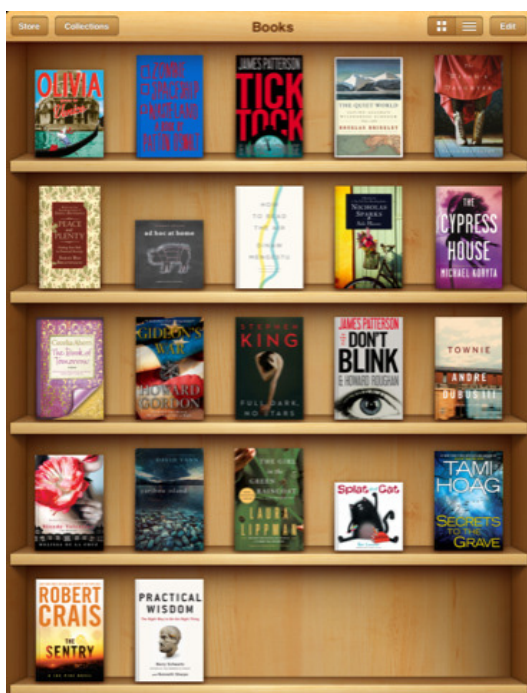


Figure 36 shows iPad application iBooks



Figure 37 shows iBookstore

Affordance

Make use of affordance where it's possible (Norman, 1988b). This should be applied when creating the design of the GUI of the application. The user should know how to use an element by looking at it. It shouldn't be necessary to ask a friend or go through tutorials to

understand the different functionalities in the application. A video tutorial of the iAnnotate usage and features was created to help the students. The feedback we received from our surveys tells us that almost 50% of the students did use the tutorials to get started with educational applications in this project.

Complexity

Norman suggested that one should manage complexity by keeping the number of features, actions and controls balanced under the topic “how to become a better designer” (Norman, 1988b). We believe that learning and educational applications that apply interactivity should be designed differently than other categories of applications. The activities such as reading, writing and annotating in learning applications are used on an everyday basis if the students like it or not. Like a student said in our focus group; “Why are there so many features in the iAnnotate application when we only use it for reading and writing notes?” The label feature is an example as you see in the Figure 38. It works like a stamp on PDF files. This is mostly used by organizations that approve documents. It’s hardly used by the students in their daily study environment, thus it is unnecessary to have a feature that is not used. The application should provide all of the needed utilities and nothing more. Every other feature that doesn’t have anything to do with studies confuses rather than helps. Nielsen said if systems are difficult to use, people will stop using them and try to find other competitors (Nielsen, 2003).

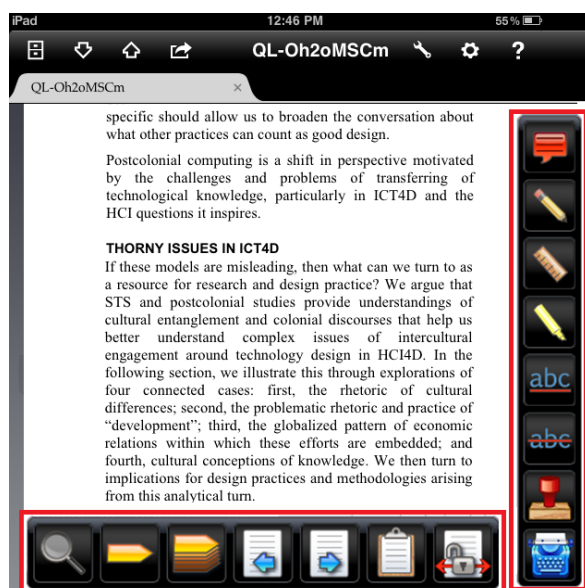


Figure 38 iAnnotate: example of too many features that are not used in a study environment.

Context of use

The physical environment should also be taken into consideration before replacing the paper syllabus. The textbooks can be placed anywhere on a table and be read from different angles. A tablet can also be placed anywhere on a table, but it's difficult to read and interact with it since the visual angle is wrong. You can always hold it with your hands and then change the angle, but that won't be convenient for a long period of time because of its weight. The solution for this issue is to get a case that supports various angles.

We didn't get that for our project, and this was one of the reasons that students didn't use the iPad in their classroom as we thought they would. You can see in Figure 39 below how the iPad's should be placed on a table.



Figure 39 shows iPads used with their case. Picture taken at a New York City public school (Editor, 2011)

7 Conclusion

Our study discovered what potential the tablet iPad has in a learning situation to come up with alternative methods for studying. We have looked at various factors. We think that in order to adopt a technology there should not be any complexity involved in all processes in the transition.

We have experienced that motivation among the user group aids the outcome of an empirical study, especially where Information Technology is involved. The interest of the user group is the key to having a cooperative project where the users are dedicated, flexible, and tolerant in terms of cooperation. We are confident that the outcome of our findings would have been different if user interest was not in place.

We saw that the learnability of the tablet and how to use it was picked up quickly by the students. However, to understand and learn the whole system for studying was a different agenda in the opposite direction, which includes the applications and the environment around them. Surprisingly, this learning period took some time and could have been avoided. Many of the factors that went wrong in the project have nothing to do with the tablet technology, but rather the circumstances of the project. Planning is the key. The project could have been planned differently where quality assurance, usability testing, and learnability should have been prioritized by the University Library. The study environment should also be considered in the process of planning, including how a tablet is physically placed and held by the student in order to make the experience comfortable and useable. Because of the element mentioned above, the iPad tablet was not used in the classroom as we hoped, and especially for writing purposes where you need to have a proper angle in order to write with the on-screen keyboard.

This thesis is about how a tablet could be used instead of a paper-based textbook and a pen in a learning situation. We can conclude by saying that the tablet was not used for writing. The students were enthusiastic on finding a solution for writing which is efficient enough for their use, as the provided solution with the on-screen keyboard is not. We believe the results would have been different if an optimized stylus for the iPad tablet would have been available, as this is the most requested input type together with an external keyboard in our

study. Supporting a stylus only approach is not enough; the functionality and the user experience should be improved and implemented within the writing applications.

Study wise, the tablet was mostly used for reading the syllabus. The proof is that the iPad tablet reduced unnecessary use of printing because of the syllabus being available and portable with a one finger touch. The majority used the iPad tablet for reading while studying and not in any lectures. We believe the iPad tablet experience can be used for reading and annotating only from a study point of view, but it has the potential to take over all study activities if the syllabus, environment, and the applications have been optimized for study purposes. By that we mean the interaction design of the application that is being used should not have optional functionality that goes beyond the study domain. That causes confusion with the interaction rather than clarity between the tablet and the end user.

Mobile computing can enable collaboration on a different level than what we are used to with physical books. In our study, the only collaboration between the students was executed in the lab class. The sharing wasn't done by using the technology, but rather by the students sharing the tablets between each other physically. The applications used didn't really enable collaboration except for sharing notes, which was hardly used since nobody wrote any notes. The collaboration functionality should be embedded on the application level by taking advantage of mobile computing in order to assure usage. If the collaboration functionality is implemented on the document management level, it will only be used for sharing files, and not enable collaboration among the users as afforded by social networks.

A tablet is not a book. The potential of it in terms of software and hardware is not being exploited well enough for learning purpose in our study. We believe the tablet has the potential to create new ways of learning. The source of the tablet syllabus has been the textbook which has been replicated in the form of a PDF file placed onto the device. The only thing the tablet has provided is the application and the utilities to manage and read the PDF file. We can conclude by saying that the "text and picture" syllabus paradigm needs a change in the tablet domain. That change consists of converting the current tablet syllabus into an interactive one, which enables rich multimedia content merged with mobile computing. It will then enable features like 3D rotating figures, embedded videos, and social networks that will create a new way of learning and for the first time take advantage of ubiquitous computing.

7.1 Future

Some of our findings highlight research areas that need to be further explored. Our empirical study concentrated on pre-chosen applications for read and write, and how we can improve the current syllabus and make it interactive and innovative. Research should be done on getting one application that covers the use case of studying in higher education. This research can be divided into several parts.

- How writing can be done in the most efficient way on a tablet.
- Figure out how an interactive syllabus can be implemented, and in which data format it should exist so content providers and distributors are in favor with it.
- A full evaluation done of existing applications and platforms that provides interactive content for learning purpose on a tablet.
- Come up with ideas that enable the creating of interactive syllabus in the most efficient and easy way.
- How social networks can be integrated into interactive syllabus in order to create new ways of collaborations.
- Figure out how an integrated distribution channel for syllabus can be implemented directly into the application where requirements of the involved parties get satisfied.

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Appendix A: Questionnaire early-stages




1. What is your sex?

[Create Chart](#)
[Download](#)

| | | Response Percent | Response Count |
|--------|---|-------------------|----------------|
| Male |  | 72.7% | 24 |
| Female |  | 27.3% | 9 |
| | | answered question | 33 |
| | | skipped question | 0 |






2. What age group are you in?





[Create Chart](#)
[Download](#)

| | | Response Percent | Response Count |
|-------|--|-------------------|----------------|
| 20-25 |  | 36.4% | 12 |
| 26-30 |  | 39.4% | 13 |
| 31+ |  | 24.2% | 8 |
| | | answered question | 33 |
| | | skipped question | 0 |






3. Which region are you from?


[Create Chart](#)
[Download](#)

| | | Response Percent | Response Count |
|----------------|---|-------------------|----------------|
| Scandinavia |  | 51.5% | 17 |
| Rest of Europe |  | 9.1% | 3 |
| Africa |  | 3.0% | 1 |
| America | | 0.0% | 0 |
| Asia |  | 33.3% | 11 |
| Australia |  | 3.0% | 1 |
| | | answered question | 33 |
| | | skipped question | 0 |

| 4. * Have you used a device with a touch screen technology before? | | |  Create Chart |  Download |
|--|---|--|--|--|
| | | | Response Percent | Response Count |
| Yes |  | | 54.5% | 18 |
| No |  | | 45.5% | 15 |
| | | | answered question | 33 |
| | | | skipped question | 0 |

PAGE: 2

| 5. How much have you used touch devices before? | | |  Create Chart |  Download |
|---|--|--|--|--|
| | | | Response Percent | Response Count |
| Frequently |  | | 50.0% | 9 |
| Rarely |  | | 38.9% | 7 |
| Barely tried |  | | 11.1% | 2 |
| | | | answered question | 18 |
| | | | skipped question | 15 |

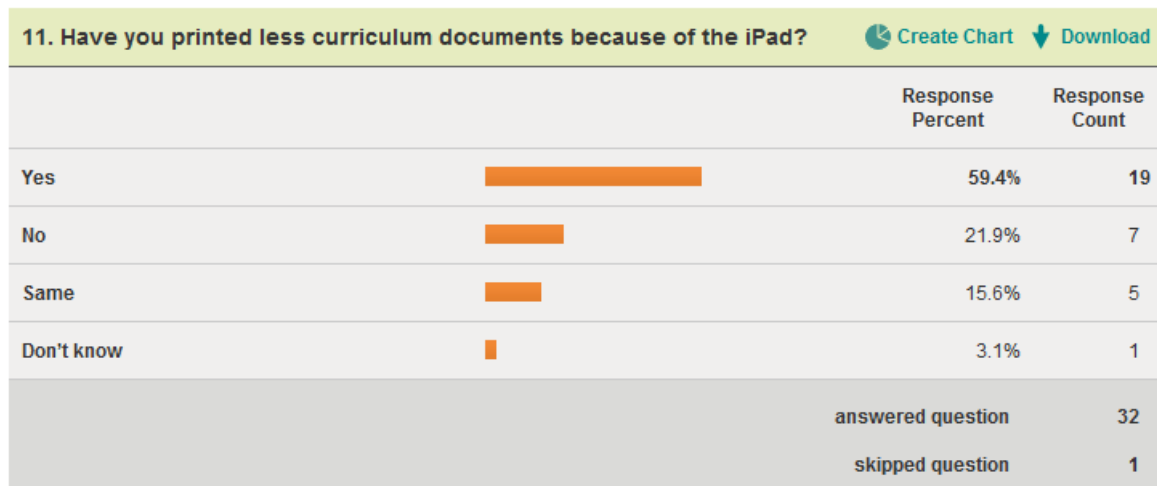
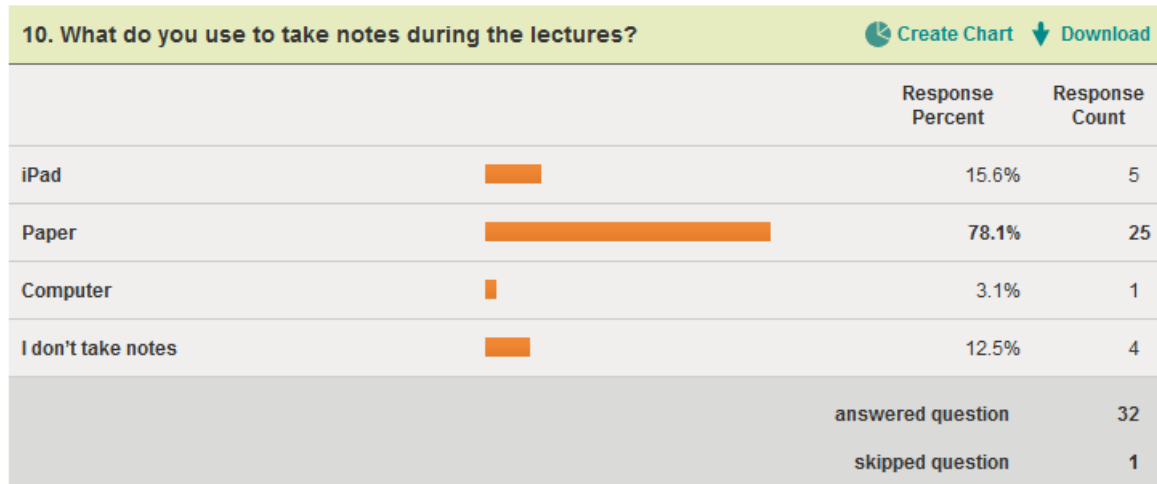
| 6. Have you used any Apple products before? | | |  Create Chart |  Download |
|---|---|--|--|--|
| | | | Response Percent | Response Count |
| iPhone |  | | 61.1% | 11 |
| iPod |  | | 38.9% | 7 |
| iPad |  | | 22.2% | 4 |
| Other touch products |  | | 33.3% | 6 |
| | | | answered question | 18 |
| | | | skipped question | 15 |

| 7. * Have you used the iPad as a study material in the GEO4220 course? | | | Create Chart | Download |
|--|------------------------|-------------------|------------------------------|--------------------------|
| | | Response Percent | Response Count | |
| Yes | <div><div></div></div> | 72.2% | 13 | |
| No | <div><div></div></div> | 27.8% | 5 | |
| | | answered question | 18 | |
| | | skipped question | 15 | |

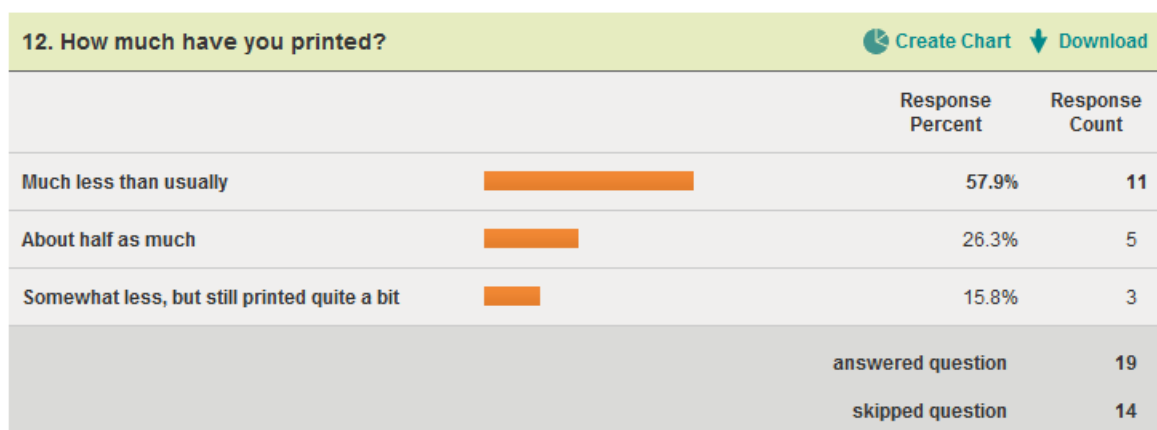
PAGE: CURRICULUM

| 8. Do you, in addition to syllabus on the iPad, use the paper version of the syllabus? | | | Create Chart | Download |
|--|------------------------|-------------------|------------------------------|--------------------------|
| | | Response Percent | Response Count | |
| Yes | <div><div></div></div> | 40.6% | 13 | |
| No | <div><div></div></div> | 56.3% | 18 | |
| Going to | <div><div></div></div> | 3.1% | 1 | |
| | | answered question | 32 | |
| | | skipped question | 1 | |

| 9. How do you read the syllabus? | | | Create Chart | Download |
|----------------------------------|------------------------|-------------------|------------------------------|--------------------------|
| | | Response Percent | Response Count | |
| iPad | <div><div></div></div> | 68.8% | 22 | |
| Paper-based | <div><div></div></div> | 50.0% | 16 | |
| Computer | <div><div></div></div> | 37.5% | 12 | |
| | | answered question | 32 | |
| | | skipped question | 1 | |





PAGE: 4





| 13. How do you feel navigation is in the syllabus? | | | | | | | Create Chart Download |
|--|-----------|-----------|-----------|-----------|----------------|----------------|---|
| | Very easy | Easy | OK | Difficult | Very Difficult | Rating Average | Response Count |
| Searching for keywords | 21.1% (4) | 36.8% (7) | 31.6% (6) | 10.5% (2) | 0.0% (0) | 2.32 | 19 |
| Navigating from one page to another | 31.6% (6) | 36.8% (7) | 26.3% (5) | 5.3% (1) | 0.0% (0) | 2.05 | 19 |
| Finding a specific chapter | 10.5% (2) | 36.8% (7) | 36.8% (7) | 10.5% (2) | 5.3% (1) | 2.63 | 19 |
| answered question | | | | | | | 19 |
| skipped question | | | | | | | 14 |

| 14. *Would you have payed to get the syllabus on iPad? | | | | Create Chart Download |
|--|---|------------------|----------------|---|
| | | Response Percent | Response Count | |
| Yes |  | 3.1% | 1 | |
| No |  | 71.9% | 23 | |
| Don't know |  | 12.5% | 4 | |
| Maybe |  | 12.5% | 4 | |
| answered question | | | 32 | |
| skipped question | | | 1 | |

| 15. * Did you know that you, through your library, have access to a large number of e-books and other electronic readings? | | | | Create Chart Download |
|--|---|------------------|----------------|---|
| | | Response Percent | Response Count | |
| Yes |  | 81.3% | 26 | |
| No |  | 18.8% | 6 | |
| answered question | | | 32 | |
| skipped question | | | 1 | |



16. Have you experienced any difficulties using the iPad in the classroom?

[Create Chart](#)
[Download](#)

| | | Response Percent | Response Count |
|-----|---|-------------------|----------------|
| Yes |  | 43.3% | 13 |
| No |  | 56.7% | 17 |
| | | answered question | 30 |
| | | skipped question | 3 |




17. Is it difficult to read the syllabus on the iPad for a long period?

[Create Chart](#)
[Download](#)

| | | Response Percent | Response Count |
|-----|---|-------------------|----------------|
| Yes |  | 46.7% | 14 |
| No |  | 53.3% | 16 |
| | | answered question | 30 |
| | | skipped question | 3 |

18. How much do you use the iPad for reading each day?






[Create Chart](#)
[Download](#)

| | | Response Percent | Response Count |
|-------------------|---|-------------------|----------------|
| Less than 1 hour |  | 46.7% | 14 |
| 1-2 hours |  | 36.7% | 11 |
| More than 2 hours |  | 16.7% | 5 |
| | | answered question | 30 |
| | | skipped question | 3 |





21. Did you find the iAnnotate PDF application useful in terms of marking and annotating in the curriculum?

 Create Chart  Download

| | | Response Percent | Response Count |
|---------------|---|-------------------|----------------|
| Very terrible |  | 13.3% | 4 |
| terrible |  | 23.3% | 7 |
| OK |  | 40.0% | 12 |
| Useful |  | 20.0% | 6 |
| Very useful |  | 3.3% | 1 |
| | | answered question | 30 |
| | | skipped question | 3 |



22. Did you use the iAnnotate PDF application to mark and annotate in the curriculum?

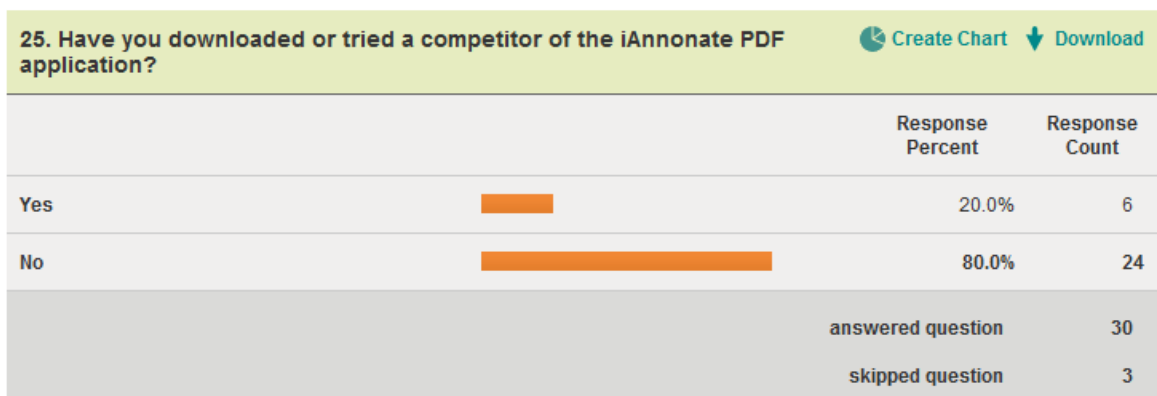
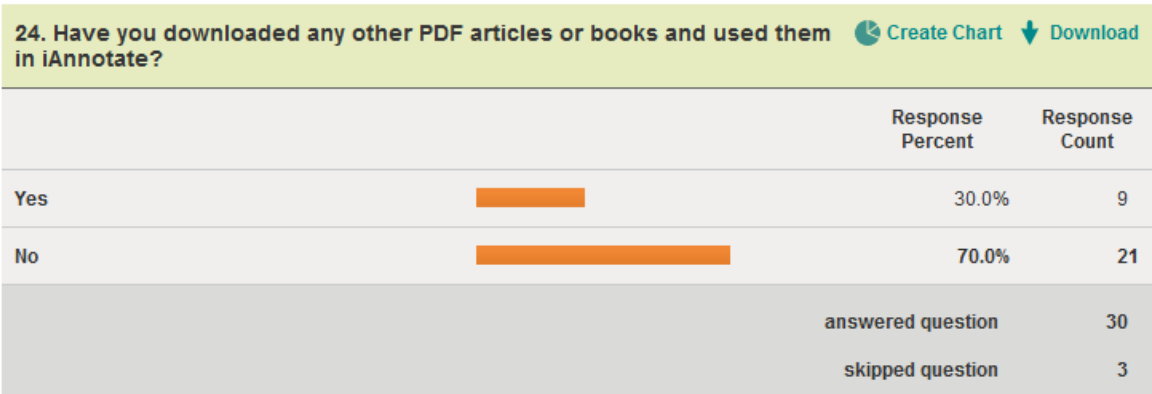
 Create Chart  Download

| | | Response Percent | Response Count |
|-----|---|-------------------|----------------|
| Yes |  | 60.0% | 18 |
| No |  | 40.0% | 12 |
| | | answered question | 30 |
| | | skipped question | 3 |

23. Have you used the search function in iAnnotate PDF?

 Create Chart  Download

| | | Response Percent | Response Count |
|-----|---|-------------------|----------------|
| Yes |  | 66.7% | 20 |
| No |  | 33.3% | 10 |
| | | answered question | 30 |
| | | skipped question | 3 |







| 26. Have you used any tutorials to get started with the different applications on the iPad? | | | Create Chart | Download |
|---|-------------|-------------------|------------------------------|--------------------------|
| | | Response Percent | Response Count | |
| Yes | <div></div> | 50.0% | 15 | |
| No | <div></div> | 50.0% | 15 | |
| | | answered question | 30 | |
| | | skipped question | 3 | |

| 27. Have you used Dropbox on your computer? | | | Create Chart | Download |
|---|-------------|-------------------|------------------------------|--------------------------|
| | | Response Percent | Response Count | |
| Yes | <div></div> | 53.3% | 16 | |
| No | <div></div> | 40.0% | 12 | |
| Don't know what Dropbox is | <div></div> | 6.7% | 2 | |
| | | answered question | 30 | |
| | | skipped question | 3 | |



PAGE: COLLABRATION/COMMUNICATION

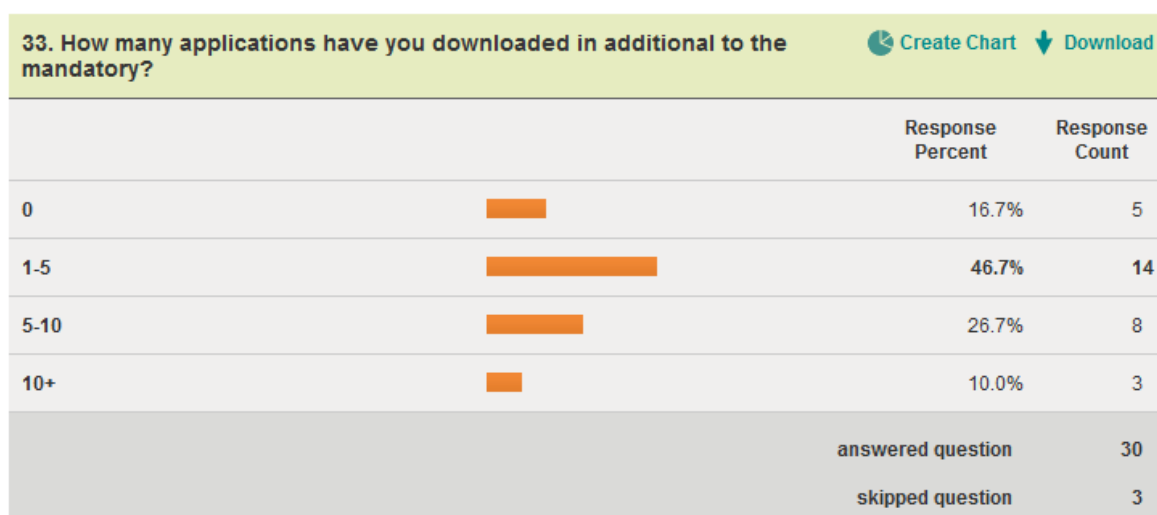
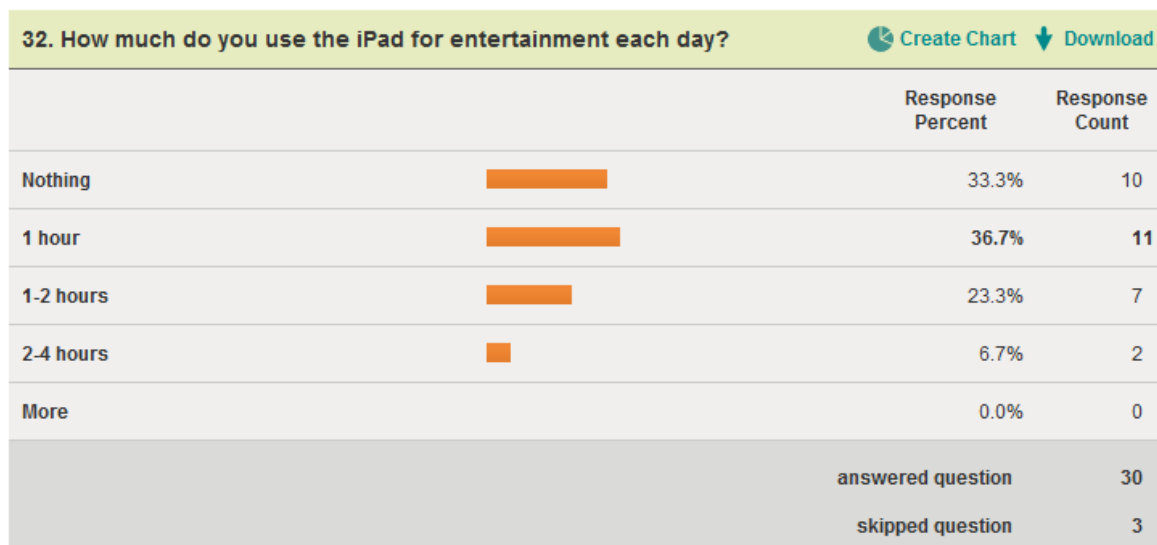
| 28. When it comes to collaborative work, do you find the iPad useful? | | | Create Chart | Download |
|---|-------------|-------------------|------------------------------|--------------------------|
| | | Response Percent | Response Count | |
| Yes | <div></div> | 73.3% | 22 | |
| No | <div></div> | 26.7% | 8 | |
| | | answered question | 30 | |
| | | skipped question | 3 | |

| 29. Have you shared any notes with other students using the iPad? | | | Create Chart | Download |
|---|-------------|-------------------|------------------------------|--------------------------|
| | | Response Percent | Response Count | |
| Yes | <div></div> | 26.7% | 8 | |
| No | <div></div> | 73.3% | 22 | |
| | | answered question | 30 | |
| | | skipped question | 3 | |

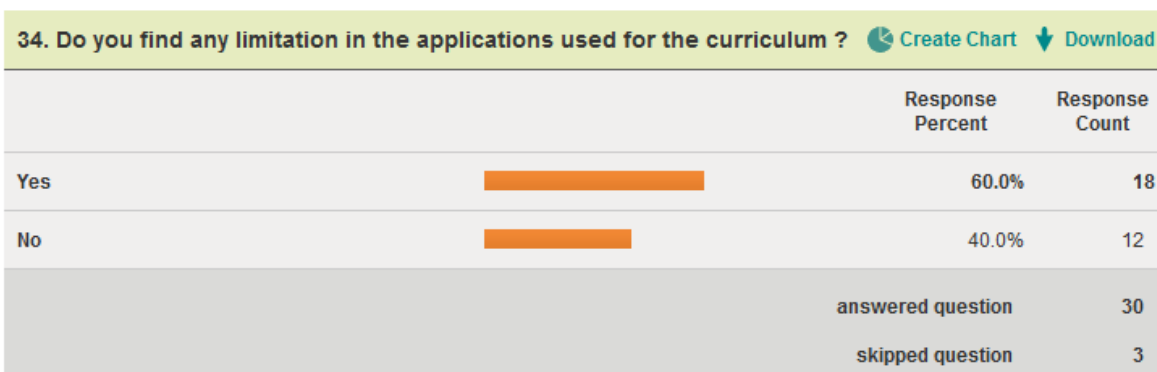
| 30. Have you used the iPad to communicate with other people over chat/email? | | |  Create Chart |  Download |
|--|---|--|--|--|
| | | | Response Percent | Response Count |
| Yes |  | | 60.0% | 18 |
| No |  | | 40.0% | 12 |
| | | | answered question | 30 |
| | | | skipped question | 3 |

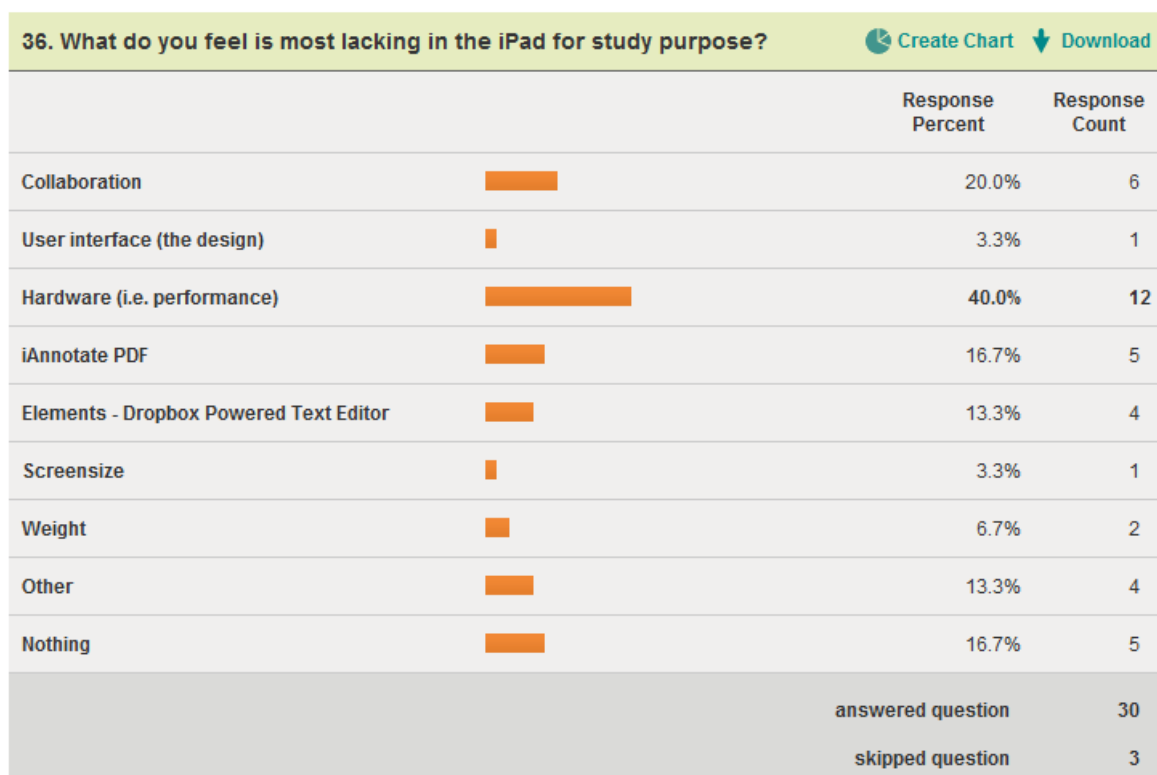
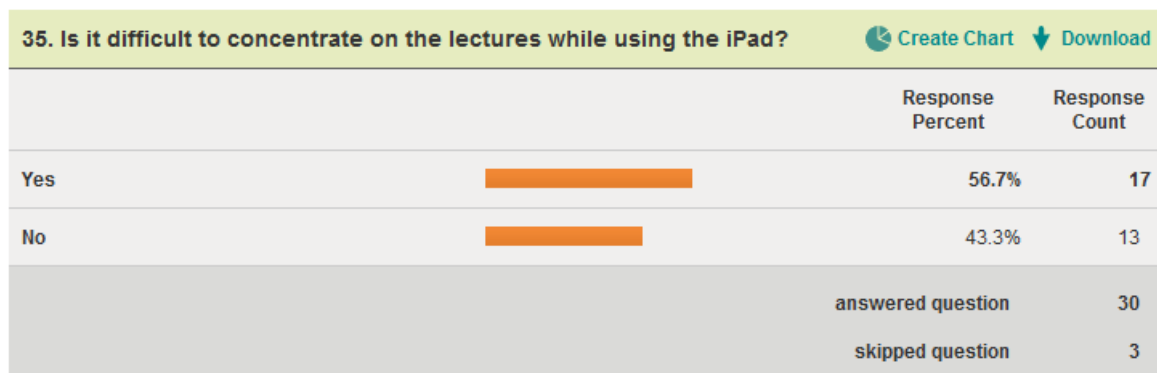
PAGE: ENTERTAINMENT

| 31. How entertaining do you think the iPad is? | | | | | | |  Create Chart |  Download |
|--|----------|------------------|-----------|-------------|-------------------|----------------|--|--|
| | Boring | Not entertaining | OK | Enertaining | Very entertaining | Rating Average | Response Count | |
| For studying purpose | 6.7% (2) | 20.0% (6) | 26.7% (8) | 36.7% (11) | 10.0% (3) | 3.23 | 30 | |
| For entertainment purpose | 3.7% (1) | 3.7% (1) | 25.9% (7) | 44.4% (12) | 22.2% (6) | 3.78 | 27 | |
| | | | | | | | answered question | 30 |
| | | | | | | | skipped question | 3 |








PAGE: LIMITATIONS







37. How is the iPad to use?

[Create Chart](#) [Download](#)

| | | Response Percent | Response Count |
|---------------------|---|------------------|----------------|
| Very easy to use |  | 44.4% | 12 |
| Easy to use |  | 22.2% | 6 |
| OK to use |  | 22.2% | 6 |
| Complex to use |  | 7.4% | 2 |
| Very complex to use |  | 3.7% | 1 |
| answered question | | | 27 |
| skipped question | | | 6 |





38. Compare to regular books, how do you think the iPad is to carry around?

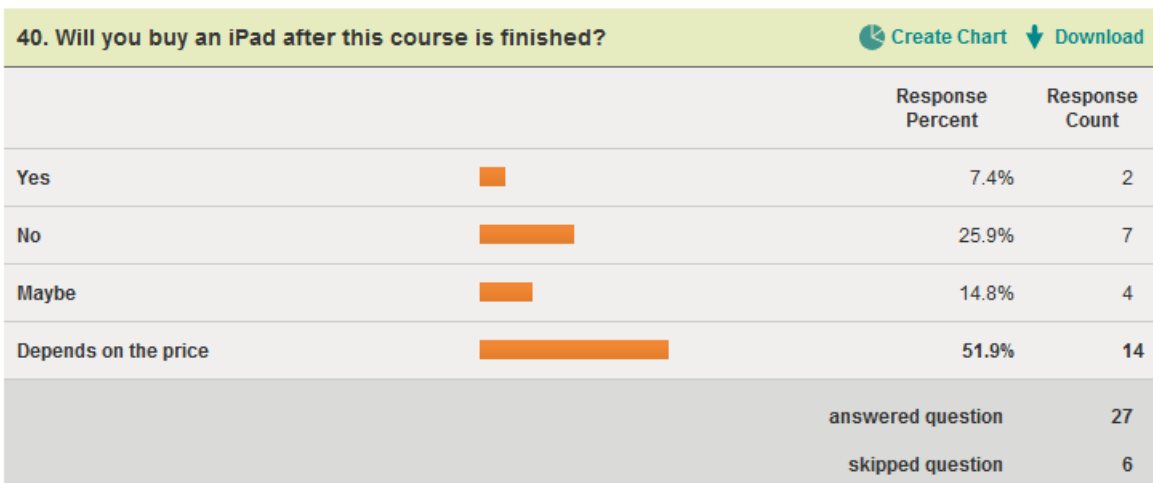
[Create Chart](#) [Download](#)

| | | Response Percent | Response Count |
|-------------------|---|------------------|----------------|
| very portable |  | 77.8% | 21 |
| portable |  | 22.2% | 6 |
| Not portable | | 0.0% | 0 |
| answered question | | | 27 |
| skipped question | | | 6 |

39. Where have you used the iPad?

[Create Chart](#) [Download](#)

| | | Response Percent | Response Count |
|---|---|------------------|----------------|
| University |  | 88.9% | 24 |
| While traveling (bus, train, car, flight) |  | 48.1% | 13 |
| Home |  | 63.0% | 17 |
| Work |  | 18.5% | 5 |
| answered question | | | 27 |
| skipped question | | | 6 |



| 41. What is the best with iPad as a learning tool? | | Download |
|---|--|----------------|
| | | Response Count |
| Hide Responses | | 23 |
| i pad 2 3/14/11 2:04AM | | |
| search curriculum 11/8/10 7:44PM | | |
| easy to carry many e books together 11/8/10 6:55AM | | |
| easy to carry about 11/3/10 10:03PM | | |
| you can store plenty of data in it 11/3/10 6:31PM | | |
| its lightweight 11/2/10 8:16PM | | |
| ease of zooming figures and text size 11/1/10 9:29PM | | |
| if pages open faster so it will be a beneficial tool,provided wifi i can search any topic anywhere 10/30/10 10:23AM | | |
| It is easy to use and the best tool is iannotate PDF is very usefull tool 10/30/10 6:03AM | | |
| Having all your paper in one place... 10/30/10 1:27AM | | |
| The curriculum is always available and it is easy to look up definitions etc during lectures for better understanding. 10/29/10 3:16PM | | |
| easily portable in the classroom 10/29/10 6:29AM | | |
| easy search engine,portable 10/29/10 6:22AM | | |
| easy to carry 10/29/10 4:24AM | | |
| easy to port, easy to handle, everything ok 10/29/10 3:21AM | | |
| Interactiv learning 10/29/10 12:37AM | | |
| you can search up terms mentioned during the lectures 10/29/10 12:11AM | | |
| Portability 10/29/10 12:02AM | | |
| HAVING EVERY THING AT SAME PLACE 10/28/10 7:16PM | | |
| It is a new and innovative way of learning. It reduces the weight of carrying many books. 10/28/10 7:02PM | | |
| kan laste ned forelesningene og ta notater på dem 10/28/10 6:54PM | | |
| Portability 10/28/10 6:36PM | | |
| Light and easy to read on and have the lectures in pdf. Could be easy to take notes, but you need a external keyboard 10/28/10 5:55PM | | |
| answered question | | 23 |
| skipped question | | 10 |

| 42. What is the worst with iPad as a learning tool? | | Download |
|---|----------------|----------|
| | Response Count | |
| | Hide Responses | 23 |
| i pad 1 3/14/11 2:04AM | | |
| performance 11/8/10 7:44PM | | |
| very difficult to make notes on i pad 11/8/10 6:55AM | | |
| out of controll with what happens when you touch the screen 11/3/10 10:03PM | | |
| not easy to read on it for many hours, since the screen is horizontal and you have to bend your neck to look at it. 11/3/10 6:31PM | | |
| taking notes and highlighting sentences 11/2/10 8:16PM | | |
| difficulty in typrng and noting the lecture points 11/1/10 9:29PM | | |
| nothing 10/30/10 10:23AM | | |
| It is little bit slow. 10/30/10 6:03AM | | |
| I do not know how to make sketches in notes efficiently. 10/30/10 1:27AM | | |
| Can not take notes during lectures as fast as on paper. 10/29/10 3:16PM | | |
| elements 10/29/10 6:29AM | | |
| it dont have styler 10/29/10 6:22AM | | |
| force to buy and use apple products 10/29/10 4:24AM | | |
| there should be a USB port to attach 10/29/10 3:21AM | | |
| Problem with the syllabus 10/29/10 12:37AM | | |
| it cannot open all files on the internet 10/29/10 12:11AM | | |
| Slow loading of pdfs 10/29/10 12:02AM | | |
| Slow loading of pdfs 10/29/10 12:02AM | | |
| NEED TO UPDATE REGULARLY 10/28/10 7:16PM | | |
| Yet to find anything negative in it. 10/28/10 7:02PM | | |
| er avhengi av trådløst nettverk, er ubrukelig for å brukes på nettet på flere steder på universitetet 10/28/10 6:54PM | | |
| Typing 10/28/10 6:36PM | | |
| The keyboard, specially writing fast using touch method 10/28/10 5:55PM | | |
| answered question | | 23 |
| skipped question | | 10 |

43. Have we forgotten to ask you something you want to share?

[Download](#)




| | Response Count |
|--|----------------|
| Hide Responses | 15 |
| no... 11/8/10 7:44PM | |
| no 11/8/10 6:55AM | |
| not possible to connect to Internett at home 11/3/10 10:03PM | |
| no 11/1/10 9:29PM | |
| no 10/30/10 10:23AM | |
| no 10/30/10 6:03AM | |
| No 10/29/10 3:16PM | |
| In student housing we have no wi-fi. So we only use it in the university, if we can use it in the house, its better for us. 10/29/10 6:29AM | |
| nops 10/29/10 6:22AM | |
| if you have a electronic device, which one is more important for you: 1-user friendly 2-environmental friendly 3-security 4-price 5-free choice (software, E-material and ...) for me the last one is more important! 10/29/10 4:24AM | |
| no 10/29/10 3:21AM | |
| No 10/29/10 12:37AM | |
| it is a bit slow to load the pages in the curriculum when you are looking for something special in the text. 10/29/10 12:11AM | |
| NO 10/28/10 7:16PM | |
| about Question 36..... I wish there would have been a small pencil with it and an application which would convert the words you write on the screen in a MS word format. That would have been much easier than typing things that the teacher is saying during the lecture. 10/28/10 7:02PM | |
| answered question | 15 |
| skipped question | 18 |

Appendix B: Questionnaire last-stages

PAGE: TAKING NOTES

1. How you are taking your notes?




 Create Chart  Download

| | | Response Percent | Response Count |
|--------------------|---|------------------|----------------|
| Ipad |  | 19.0% | 4 |
| Pen and Paper |  | 71.4% | 15 |
| I don't take notes |  | 9.5% | 2 |
| answered question | | | 21 |
| skipped question | | | 0 |

PAGE: TAKING NOTES VIA PEN AND PAPER

2. Why you don't take notes with the iPad?





 Create Chart  Download

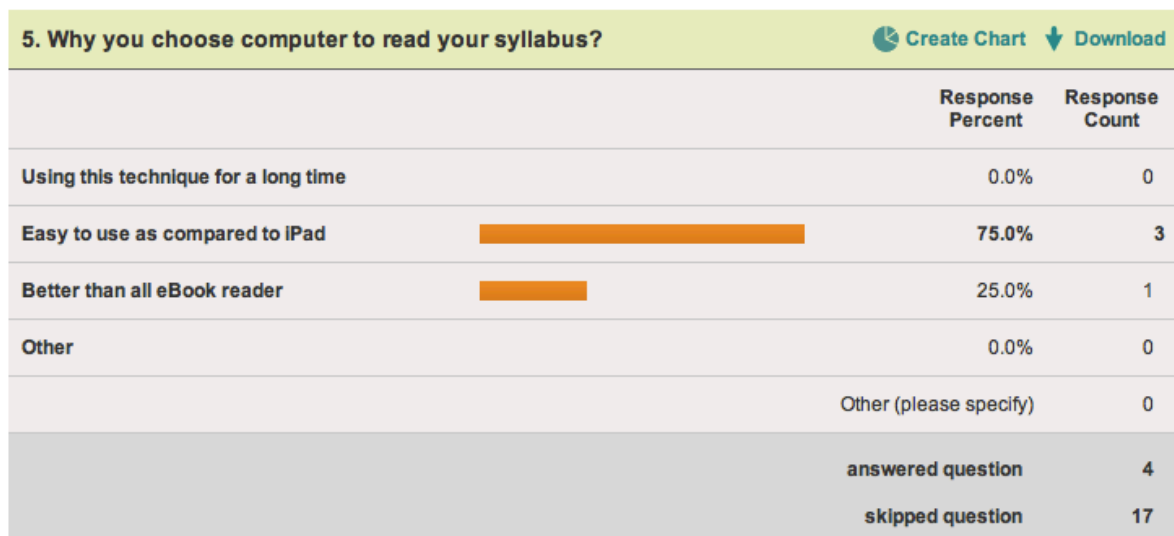
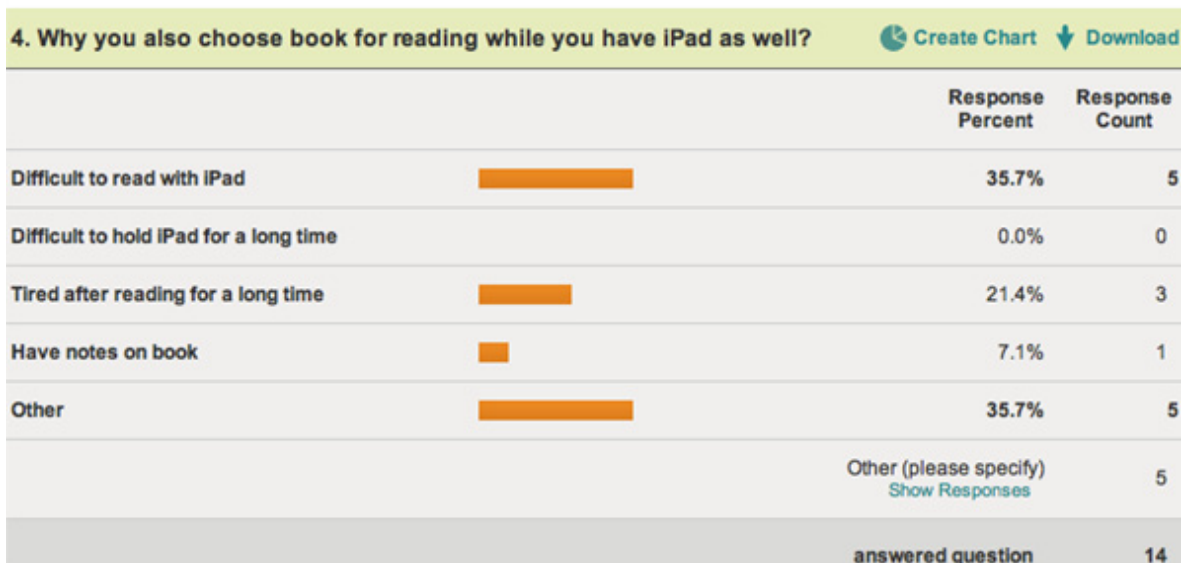
| | | Response Percent | Response Count |
|--|---|------------------|----------------|
| Not possible with on screen keyboard |  | 53.3% | 8 |
| With finger writing become very large |  | 26.7% | 4 |
| Environment is not good enough (no table, difficult to hold iPad etc) |  | 20.0% | 3 |
| answered question | | | 15 |
| skipped question | | | 6 |

PAGE: READING SYLLABUS

3. How do you read the syllabus?




 Create Chart  Download

| | | Response Percent | Response Count |
|--------------------|---|------------------|----------------|
| IPad |  | 14.3% | 3 |
| Book |  | 14.3% | 3 |
| Computer |  | 19.0% | 4 |
| Both IPad and Book |  | 52.4% | 11 |
| answered question | | | 21 |
| skipped question | | | 0 |






6. Which interface provided easier navigation, browsing or entertainment?

[Create Chart](#)
[Download](#)

| | | Response Percent | Response Count |
|--------------------------------------|---|-------------------|----------------|
| Finger and on screen keyboard |  | 44.4% | 8 |
| Stylus and on screen keyboard |  | 11.1% | 2 |
| External Mouse and external keyboard |  | 44.4% | 8 |
| | | answered question | 18 |
| | | skipped question | 3 |





7. What do you feel about navigation in iPad with the finger?







[Create Chart](#)
[Download](#)

| | | Response Percent | Response Count |
|----------------|---|-------------------|----------------|
| Very easy |  | 50.0% | 9 |
| Easy |  | 33.3% | 6 |
| OK |  | 16.7% | 3 |
| Difficult | | 0.0% | 0 |
| Very difficult | | 0.0% | 0 |
| | | answered question | 18 |
| | | skipped question | 3 |





8. Have you tried some other user interfaces with the iPad?

[Create Chart](#)
[Download](#)



| | | Response Percent | Response Count |
|--|---|-------------------|----------------|
| External mouse |  | 5.6% | 1 |
| External keyboard |  | 5.6% | 1 |
| Stylus | | 0.0% | 0 |
| No, I donot have any other user interfaces |  | 50.0% | 9 |
| No, I donot have tried |  | 38.9% | 7 |
| | | answered question | 18 |
| | | skipped question | 3 |

| 9. If you want to take notes during lecture so what type of user interface will you prefer? | | |  Create Chart |  Download |
|---|---|------------------|--|--|
| | | Response Percent | Response Count | |
| on screen keyboard |  | 22.2% | 4 | |
| External keyboard |  | 33.3% | 6 | |
| Using finger |  | 11.1% | 2 | |
| Stylus(like a pen) |  | 33.3% | 6 | |
| | | | answered question | 18 |
| | | | skipped question | 3 |

PAGE: INTERACTIVE APPLICATION



| 10. Do you think interactive syllabus is something we should focus on in your subject instead of iAnnotate? | | |  Create Chart |  Download |
|---|---|------------------|--|--|
| | | Response Percent | Response Count | |
| Yes |  | 50.0% | 9 | |
| No |  | 50.0% | 9 | |
| | | | answered question | 18 |
| | | | skipped question | 3 |

PAGE: FUNCTIONALITY TO BE ADDED IN THE APPLICATION

| 11. What type of functionality you want to add in such a application? | | |  Create Chart |  Download |
|---|---|------------------|--|--|
| | | Response Percent | Response Count | |
| 3d |  | 44.4% | 8 | |
| Video viewing |  | 50.0% | 9 | |
| Other |  | 16.7% | 3 | |
| | | | Other (please specify) Show Responses | 2 |
| | | | answered question | 18 |
| | | | skipped question | 3 |




12. Do you think that you can use iPad as ebook reader in the next semester?

 [Create Chart](#)  [Download](#)

| | | Response Percent | Response Count |
|-------------------|---|------------------|----------------|
| Yes |  | 44.4% | 8 |
| No |  | 55.6% | 10 |
| answered question | | | 18 |
| skipped question | | | 3 |

13. Should we keep the old classic books, or should we try to get more digitalizes syllabus?

 [Create Chart](#)  [Download](#)

| | | Response Percent | Response Count |
|----------------------------|---|------------------|----------------|
| digitalizes it |  | 16.7% | 3 |
| No, I like the paper books |  | 27.8% | 5 |
| A combination is good |  | 55.6% | 10 |
| answered question | | | 18 |
| skipped question | | | 3 |

Appendix C: Interview agenda

Interview agenda 1st November 2010 (10:00 – 11:30)

Introduction

Interview will take 10-15 minutes and we want to hear your experience about adopting iPad technology for educational purpose. Further, we want to get feedback about the challenges you have faced so far.

What is your name?

Experience

What is your experience about the iPad use in academic context?

Questionnaire result

We got answers during questionnaire session that less than 50% is still using paper version of the syllabus. What you have to say about this fact?

Do you find any difficulties while using the read and write applications provided?

Somebody also raises point about the hardware performance of the iPad is not good enough. Do you know about this fact?

More than 40% said that it's hard to do annotations. Do you experience any difficulties while using iAnnotate application?

Observation result during lecture

We observed during lecture that nobody is using iPad for taking notes. What you have to say about this fact?

We also observed that just one student has used iPad during lecture for reading. What you have to say about this fact?

Reading

Do you feel comfortable reading on the iPad?

Other issues

Are there any other things you want to share with us?

Appendix D: Interviews

Interview 1

Introduction

1) What is your name?

My name is “Anonymous”.

Experience

2) What is your experience about the iPad use in academic context?

My experience with iPad is good, and I think it's a good initiative by the university to use iPad for reading syllabus.

Questionnaire result

3) We got answers during questionnaire session that less than 50% is still using paper version of the syllabus. What you have to say about this fact?

No, I don't know about this but I use iPad to read.

4) Do you find any difficulties while using the read and write applications provided?

Reading is not 100% because there is some slowness in the syllabus PDFs files which was given to us but I do not tried to write on the iPad.

Why? (Master student)

I do not write notes.

5) Somebody also raises point about the hardware performance of the iPad is not good enough. Do you know about this fact?

I do not know about this but I think the hardware performance is excellent. It starts up quickly and I don't find any difficulty except I got some problem with my charger.

6) More than 40% said that it's hard to do annotations. Do you experience any difficulties while using iAnnotate application?

Yes, I tried annotation in the beginning. I stop it because it takes lot of time and I missed my concentration from the lectures.

Observation result during lecture

7) We observed during lecture that nobody is using iPad for taking notes. What you have to say about this fact?

No, I am not taking notes.

8) We also observed that just one student has used iPad during lecture for reading. What you have to say about this fact?

Actually, we do not have lecture slide available on the iPad.

Is the teacher have not provided the lecture slides? (Master student)

No, he has placed at the fronter but I how can I download into my iPad.

You needed just to download into your Dropbox folder (Master student)

Ok.

Reading

9) Do you feel comfortable reading on the iPad?

iPad is good for reading. I do not get any problem to read on the iPad.

Other issues

10) Are there any other things you want to share with us?

We do not have internet connection in our university student apartments due to which we spend lot of time in a university.

Interview 2

Introduction

1) What is your name?

My name is “Anonymous”.

Experience

2) What is your experience about the iPad use in academic context?

I think iPad is a perfect replacement for both syllabus and laptop. I used it first time and it is very easy to use.

Questionnaire result

3) We got answers during questionnaire session that less than 50% is still using paper version of the syllabus. What you have to say about this fact?

Sometime I use also book because it take lot of time when I move from one page to another.

Have you purchased the book? (Master student)

No, I borrowed from library.

4) Do you find any difficulties while using the read and write applications provided?

Writing is not easy because I use finger but the writing become very large that's why I use paper to take notes. For reading the iPad is perfect.

5) Somebody also raises point about the hardware performance of the iPad is not good enough. Do you know about this fact?

No, I don't know about this.

6) More than 40% said that it's hard to do annotations. Do you experience any difficulties while using iAnnotate application?

I use some video to start using annotation. It works for me.

Observation result during lecture

7) We observed during lecture that nobody is using iPad for taking notes. What you have to say about this fact?

As I told earlier that writing becomes large and that's the reason I choose paper for writing notes.

- 8) We also observed that just one student has used iPad during lecture for reading. What you have to say about this fact?**

Actually I do not want to use any digital material during lecture.

Reading

- 9) Do you feel comfortable reading on the iPad?**

I enjoy reading on iPad. I use to read newspaper, articles and syllabus books via iPad.

Do you use any iPad feature while reading? (Master student)

Yes, I like zooming functionality which made iPad good for reading.

Other issues

- 10) Are there any other things you want to share with us?**

No

Interview 3

Introduction

1) What is your name?

My name is “Anonymous”.

Experience

2) What is your experience about the iPad use in academic context?

I am happy to use iPad with my studies. In the beginning I was uncertain about how to adopt a new technology but I learned it in no time. The touch feature impressed a lot and makes easy to communicate.

Questionnaire result

3) We got answers during questionnaire session that less than 50% is still using paper version of the syllabus. What you have to say about this fact?

Ok, I use also book because the iPad is too slow to use.

4) Do you find any difficulties while using the read and write applications provided?

I think reading in iAnnotate is not difficult but it make slower to move from one page to another. I use element but not regularly.

Do you enjoy writing with iPad? (Master student)

Little bit difficult.

5) Somebody also raises point about the hardware performance of the iPad is not good enough. Do you know about this fact?

No, I do not know.

6) More than 40% said that it's hard to do annotations. Do you experience any difficulties while using iAnnotate application?

I think there is lot of features in it which is not useful for us.

For example (Master student)

There are some pictures that we do not need at all.

Observation result during lecture

- 7) We observed during lecture that nobody is using iPad for taking notes. What you have to say about this fact?**

I think they are quiet right because it's not easy to take notes on the iPad.

- 8) We also observed that just one student has used iPad during lecture for reading. What you have to say about this fact?**

I do not know but many of us have started using iPad during lecture.

Is it helpful? (Master student)

Yes, it is good to use during lecture.

Reading

- 9) Do you feel comfortable reading on the iPad?**

Yes, I feel comfortable.

Other issues

- 10) Are there any other things you want to share with us?**

Not really but there is no outlet for charging iPad in the classroom.

Yes, we observed it. We will definitely talk to administration but the iPad battery life is very good. I think you have to charge it before the lecture until the administration does not take any action about it. (Master student)

Ok.

Interview 4

Introduction

1) What is your name?

My name is “Anonymous”.

Experience

2) What is your experience about the iPad use in academic context?

My experience with the iPad is very good. I have used Kindle before but iPad is better due to multi function.

What will you prefer for reading iPad or Kindle? (Master student)

I will prefer iPad because it can work as a computer also for me.

Questionnaire result

3) We got answers during questionnaire session that less than 50% is still using paper version of the syllabus. What you have to say about this fact?

I use also books in the beginning by borrowing from the library but they have just 2 copies of syllabus text books. Then I start using iPad as a reading tool.

4) Do you find any difficulties while using the read and write applications provided?

Reading become better and better. Writing in element application is just like you are writing in a notepad. I do not really use notepad for making notes on a computer that's why I do not like element. Secondly, switching is a problem from one application to another. If I am writing notes in element so I want to switch to iAnnotate so it take lot of time due to which we will missed concentration upon the lecture.

5) Somebody also raises point about the hardware performance of the iPad is not good enough. Do you know about this fact?

No, I do not feel any hardware problem using iPad.

6) More than 40% said that it's hard to do annotations. Do you experience any difficulties while using iAnnotate application?

I think there must be some guidelines or some tutorial for iAnnotate.

Do you want some video tutorial? (Master student)

Yes

I think, you tube definitely have some tutorial about iAnnotate application but we will try to make a tutorial for you people. (Master student)

Thank you very much.

Observation result during lecture

- 7) We observed during lecture that nobody is using iPad for taking notes. What you have to say about this fact?**

Explained in the question 4 already.

- 8) We also observed that just one student has used iPad during lecture for reading. What you have to say about this fact?**

I think when you came to our classroom then the lecture notes are not available on the iPad but now everybody have notes available on the iPad.

Reading

- 9) Do you feel comfortable reading on the iPad?**

Yes, it is easy and comfortable to read on the iPad but I think Kindle is also good but it is just for reading.

Other issues

- 10) Are there any other things you want to share with us?**

No.

Interview 5

Introduction

1) What is your name?

My name is “Anonymous”.

Experience

2) What is your experience about the iPad use in academic context?

My experience with the iPad is very good. I actively start using this tool after I received it. We went to Spain for some practical session and during the field I used it and I am very comfortable with it.

Is it good for reading in the university? (Master student)

I appreciated that the university has started to work on it.

Is it easy to make a replacement of books with iPad? (Master student)

I think students will take some time in the beginning but they will definitely adopt it.

Questionnaire result

3) We got answers during questionnaire session that less than 50% is still using paper version of the syllabus. What you have to say about this fact?

I personally think that the students are combining both the books and iPad.

4) Do you find any difficulties while using the read and write applications provided?

Not really in the reading application but writing is not so good. We do not have good typing speed. I saw somebody using pen with the iPad.

Somebody student? (Master student)

No, I was in the metro and saw someone using iPad with a pen.

Actually this pen is called Stylus but it is not officially available by the Apple.

Ok.

5) Somebody also raises point about the hardware performance of the iPad is not good enough. Do you know about this fact?

No, I do not know about it.

- 6) More than 40% said that it's hard to do annotations. Do you experience any difficulties while using iAnnotate application?**

Not so much.

Observation result during lecture

- 7) We observed during lecture that nobody is using iPad for taking notes. What you have to say about this fact?**

I think we do not have enough space on a table for the iPad.

- 8) We also observed that just one student has used iPad during lecture for reading. What you have to say about this fact?**

Not sure about it. Students use it now in classroom.

Reading

- 9) Do you feel comfortable reading on the iPad?**

Yes, I am.

Other issues

- 10) Are there any other things you want to share with us?**

No.

Appendix E: Focus group agenda

Focus group agenda 8th November 2010 (10:30 – 11:30)

Introduction-part:

5 minutes of presentation where all of the students gives a very short introduction about themselves.

Theoretical questions:

WARMUP SESSION:

- 1) What are the positive/negative things about the iPad as a learning-tool?

SYLLABUS:

- 2) How do you read the syllabus in GEO4220, and why?
- 3) Why haven't you guys used the printer so much?
- 4) If the students had a choice, where they could choose between iPad syllabus and regular text syllabus, what will you have bought?

PROBLEMS:

- 5) What kind of problems have you had with the iPad during lectures?
- 6) What is the problem with reading on the iPad for so long?

iANNOTATE:

- 7) Is there anyone who is satisfied with the iAnnotate application? We are primarily thinking about annotations/notes etc.
- 8) Do you know about the search option in this application?
- 9) Which tutorials have you guys used to learn all of the features? Video? Google?
- 10) What kind of flaws do you think exist in iAnnotate, or what features are missing?

COLLABORATION:

- 11) How do you cooperate between students with the iPad?

LIMITATIONS:

- 12) Is it difficult to concentrate during lectures when your iPad is on the desk?

APPLICATIONS:

- 13) Which applications do you use while traveling from home to school, or in the bus etc?
- 14) Which other applications have you downloaded from the app-store?

Practical stuff

WIRED (approximately 15 min)

- 1) Download the wired magazine from App store, start and see if this can be anything they can imagine to have formed as their syllabus.
- 2) Show the various functions, such as rotation of shapes (mountain), video clips while they read a case study for instance.
- 3) Find out how they react, if this is not just cool, though this is something they can learn from? Or do they just want plain text syllabus? Take some time to drive around this topic, try to find out if they can imagine having this kind of syllabus setup for the GEO4220.

iANNOTATE (If we get some extra time)

- 1) First, go to Google and Type "HCI PDF". Pull down this PDF file into iAnnotate.
- 2) Find x document and start up the program, go to page 2
- 3) Write notes, makes Annotations
- 4) Doing searches on specific words go to different capitals
- 5) Share what you have written with the person sitting next to you.

TYPING (If we get some extra time)

Writing assignment: Write on an iPad and a computer that has the same text. We want to see how long it takes to write on an iPad.

Appendix F: Transcription of Focus group1

Transcription of Focus group1 conducted 8th November 2010 (10:30 – 11:30)

Introduction Part

Hello and welcome to all of you here in the workshop. The agenda for today is that we will go through first introduction round where every one of us will present our self for just 1-2 min and then after that we will move to the theoretical questions where we will ask you some questions and you will give your opinions about the questions. How you have used the iPad as a learning tool something like that. Then after that we will move to the practical stuff where you have to do some practical thing with the iPad. So, let's start with me in the introduction part.

Master Student conducting focus group

My name is Malik Naeem and I am studying master in informatics at the UiO. I am in the second last semester and write now I am writing my research thesis where my topic is how we can replace the university syllabus from text books to tablet. Before this I have done bachelor in computer sciences from the Oslo University College. That is from me and we want that you will participate and give your opinions to us. Can you present yourself?

Master Student assisting focus group

My name is "Anonymous" and I started master here this year. I am going to write master thesis next year. I take the course at informatics about HCI and how to studies around the iPad's. I did bachelor degree not from here but from college down in Oslo.

Student No 1 participating in the workshop

My name is "Anonymous" and I came from check republic so I started study here in Oslo like this semester and a student here and I am studying geology and this is my fifth year and probably going to stay next semester also here in Norway. Are you exchange student? Yes, I am exchange student and taking some course from petroleum system.

Student No 2 participating in the workshop

My name is “Anonymous” and I am a student in geology department in master program petroleum geology and petroleum geo physics 2 year program. I came from Pakistan. I have done already master from Pakistan at the University of Punjab.

Student No 3 participating in the workshop

My name is “Anonymous” from Pakistan and I am student here in geology department doing my master in petroleum geology and petroleum geo physics. I have done my master from University of the Punjab Lahore and also did my bachelor from there and looking forward to complete my master here.

Student No 4 participating in the workshop

My name is “Anonymous” and I am also student of master in petroleum geology and petroleum geo physics and I am studying in first semester of the master degree of two year program. I have to say that I take my bachelor about 20 years ago. I decided to begin again. Where are you from? I am from Iran.

Theoretical questions

Let's move on to the theoretical questions.

Master Student (Naeem)

- 1) My first question is what are the positive/negative things you have experienced with the iPad? Can anyone begin and tell little bit about positive and negative things?**

Student No 4 answering

About the positive thing I have to say that it's very flexible and it's very lightly to use iPad but two I see negative things that download some file and connection with windows is difficult. I don't know how we can do this? How they using the finger it's very better? Some time if you have some pen it's better to use for writing or doing something.

Master Student (Naeem)

But you are talking about now little bit about the application iAnnotate that it take some time to download files but I want to know about iPad.

Student No 4 answering

Until now it's difficult for me to understand system for download or any other system or findings how I try to use steady in the apple website something's. May be I have not talent but it's difficult to understand system but it is flexible.

Master Student (Naeem)

Have you used apple product before?

Student No 4 answering

No, I have not used any apple product before. Also another thing that using two pages at one time is not possible.

Master Student (Naeem)

He wants to switch between two application windows. Is it possible because I don't know about this? Can you know about this feature?

Master Student (Assisting)

Not sure. Have any of you used apple products before?

Student No 1, 2 and 3 answering

No, we have not used.

Student No 2 answering

But I have certain opinion regarding as far as my opinion is concerned everything have its good aspect as well have negative aspect. If I am talking about its positive aspect so iPad is easy to carry while you are travelling because while you are traveling you have much time to read something and if you have book so it's difficult to carry them along with you. But in iPad you can easily use as to open it and just read all the stuff and you can mark and highlight your things and make your own notes on certain points and paragraph. As far as my opinion is concerned its really good stuff while you are traveling even if you are at home or at university. If I talk about negative aspect of this the major negative thing is that I have experienced if you move from one page to another page it takes time. If you want to scroll to page let's suppose that you are on page 24 and you want to go on page 54 so it takes time sometime its irritate you because it take time and you don't want to lose your time. Sometime you are in certain position and you focus on certain thing. In book there are certain things that this figure is on the next 2 or 3 page so you always scroll up and down so it become difficult to read.

Master Student (Naeem)

I think this error is not in the iPad neither in the application iAnnotate but this exists in the PDF files which have provided to you in the syllabus and these are just scans which have given to you. If you download any other PDF so it works fine in iAnnotate and I had tried it. I know that your syllabus take some time when you move from one page to another. I know that this is a little bit error and I think that this is a syllabus PDF error.

Student No 2 answering

We are using these things first time so that's why think that its error of iPad or iAnnotate.

Master Student (Naeem)

Have you any experience about positive and negative things in your mind?

Student No 1 answering

I am not working with the iPad to often. I like to use computer for study.

Master Student (Naeem)

Do you still use computer?

Student No 1 answering

Yes. But it's very flexible because it's small and just available everywhere. For the reading it's really helpful but for writing your notes it's really very weird. If you are use to with a computer so just work on computer. But for reading devices it's good. But may be one things the capacity is 16 GB or?

Master Student (Assisting)

It can be more but this is 16 GB.

Student No 1 answering

That's not enough when you put all the material.

Master Student (Naeem)

What's your opinion?

Student No 3 answering

For me its quiet helpful device to have a course on it we can use eBooks easily. If you are using iPad we can use eBooks and study easily. But there is a problem for making notes if you are use to for using computer and using your notebook to make the notes on so it's relatively more difficult for making notes on the iPad in the classroom. Overall I think that its quiet helpful device to have a course on its lot more easily than the text books.

Master Student (Naeem)

2) Do you take notes on the iPad or with pen & paper?

Student No 1, 2, 3 answering

We use notebooks.

Student No 2 answering

Because when you take notes on the iPad so it diverts your attention. In the class you have to focus on the thing what teacher has said and what the lecture is going on? If you move to iPad to write something so it's divert your attention.

Student No 3 answering

It also takes time.

Master Student (Naeem)

- 3) Have you used any tutorial and video in which they are using stylus with the iPad? Have you seen some video about that? You can use with iPad like a pen and paper.**

Student No 1, 2 and 3 an answering

No

Master Student (As)

Stylus is like a pen.

Student No 4 answering

I saw somebody used it with iPod.

Master Student (Naeem)

I have sent a video link to you people.

Student No 4 answering

I heard something about the iPad stylus but I do not know how to use it.

Master Student (Naeem)

4) Have you takes any notes on your pc during the lecture?

Student No 1 answering

I am using just mainly the paper and pen. It is faster more flexible if the notes are on the paper, books and on the pc.

Master Student (Naeem)

You think that paper and pen is best.

Student No 1 and 2 answering

Yes, during the lecture.

Master Student (Naeem)

But for reading what do you think is it good to read on it?

Student No 1 answering

Yes, absolutely you have lots of book on it. It is the main advantage. I am not feeling any pain or tired while reading. It's really very comfortable for my eyes.

Student No 4 answering

It is really comfortable that you can enlarge the sentence. Reading is very good on it.

Master Student (Naeem)

5) Have you used any other eBook reader?

Student No 2, 3 and 4 answering

No.

Student No 1 answering

Do you mean any other electronic device for reading?

Master Student (Naeem)

Yes.

Student No 1 answering

I have heard about it but I have not used it.

Master Student (Naeem)

6) How do you read the syllabus in your course?

Master Student (Assisting)

Do you use their iPad or books to read?

Student No 2 answering

In our syllabus book as well presentations (slides) as both are included. It depends upon the person I think how he will carry the syllabus with the time. Some students only work with the presentations while some student likes me preferred to read the book instead of presentations because in presentations there are little things or just highlights the main point and we don't know about the background of the things. As far as my opinion I mostly use book instead of presentation.

Master Student (Naeem)

But what you actually choose to read on iPad or books?

Student No 2 answering

Both but some time when I am travelling so I read on iPad but in home I consult book.

Master Student (Naeem)

Do you think that book is much better to read as compared to iPad?

Student No 2 answering

Yes, book is more flexible because we are use to it. IPad is a new technology but it takes time to use to it but I think that it's not a big issue.

Master Student (Naeem)

What do you choose to read?

Student No 1 answering

In our lecture there are two kinds of information from the power point presentation and from the books. I am not sure but the book they have recommended Reader is not on the iPad.

Student No 2 answering

There are just two chapters.

Master Student (Naeem)

I think that they are working on it.

Student No 1 answering

In the library there are not enough syllabus books for everyone.

Master Student (Naeem)

Library has just 2 or 3 syllabus books.

Student No 1 answering

That's big problem because the papers (slides) are ok to get from iPad. If you have book on the iPad so I would absolutely use it. I think that we should have all the materials that have recommended must on the iPad. Even the old books are good to keep on the iPad.

Student No 2 answering

Today they said that they will give some extra chapters.

Master Student (Assisting)

Reading is a book which has 105 pages?

Student No 2 answering

Yes, but it is just 2 chapters.

Master Student (Assisting)

That's not good I think you must have whole book.

Student No 2 answering

I think 105 pages are more than enough.

Master Student (Naeem)

How do you read your syllabus using iPad or paper version?

Student No 4 answering

I use only the iPad but the problem was about the files that I missed the information in my iPad. That's why I get a message to connect to the internet may be reset. I try to connect to Internet with pc but get help from the library to do it. If there is a possibility to connect to windows pc so it is more flexible.

Master Student (Naeem)

Why you want your iPad to connect to your pc for reading purpose?

Student No 4 answering

No, I have another possibility if I get some problem.

Student No 3 answering

I have used iPad so far for study because we all know that there are not enough books in the library. I went to library then they said that there is no reading book right now so I have to study on the iPad. So far I study on the iPad. I think it's easier on the iPad if you don't have any hard copy.

Master Student (Naeem)

7) Why haven't you guys used the printer so much? Because we have asked a question in our survey where we came to know that you have not used so much printer in the semester. Is it correct?

Student No 1 and 2 answering

Yes, it is correct.

Master Student (Assisting)

Do you usually use it?

Student No 1 answering

I am using in my home but here it is little expensive. We can download the files for this course on the iPad but I would like to keep the lecture material after the course is completed in printed format. If it is in digital format so it is good.

Student No 2 answering

I will not print it because all the material is present on iPad. Whenever you have problem or to look for presentation so we just open the iPad so we study on it. It's not a big issue that we go and print out thing and we know that everything is available on it.

Master Student (Naeem)

Do you know that you have print quota for 400 pages?

Student No 2 answering

No, 250 pages.

Student No 4 answering

I think it was not need for me to print some paper from the iPad but on the other side I want to know how to connect with the printer at home by usb or any other thing.

Master Student (Naeem)

If you have a wireless printer so you can otherwise you have to purchase some cables.

Student No 3 answering

We have not used printers too much because we have everything in the iPad. We friends mostly conduct group discussions. It does not need to have printable materials. We conduct group discussion regarding any thing that we work. It is lot easier with a group discussion.

Student No 2 answering

Everyone have it and we working on the same slide so one person discuss about it. We don't need to close each other and watch on one paper.

Master Student (Naeem)

8) If you students have a choice, what you can choose between iPad syllabus and regular text syllabus, what will you buy because in this semester you have given iPad syllabus which is free to you?

Master Student (Assisting)

We mean that if the syllabus is fast (He means opening time of the PDF files is quicker)

Student No 1 answering

Both is good because the course before this we have all the material on paper and it was really comfortable for me. For me I can use both.

Student No 2 answering

As far as my opinion is concerned so we worked in a group discussion that's why I want to take the iPad syllabus in the next semester. It has many positive aspects that I told it earlier like while travelling I can use it for reading purpose.

Student No 3 answering

I will also want to have iPad. As the assisting guy has said that the syllabus is fast to use so I definitely like to have iPad.

Student No 4 answering

If I have to choose so, I will also choose iPad because it's light to carry and flexible.

Master Student (Naeem)

I don't know what will be prices for the iPad syllabus in the next semester but for this you have to purchase an iPad also because it's free for use just in this semester. This is another thing you have in your mind. It's difficult to implement such a project for whole university that's why they started a test project for your group of students. By which they want to know how students will use such a product with their syllabus.

Master Student (Assisting)

Is the books are colored?

Student No 2 answering

No, it is black and white.

Master Student (Naeem)**9) What kind of problems have you faced using iPad during lectures?****Master Student (Assisting)**

Have you tried any notes during the lecture?

Student No 1 answering

I am having a problem with the internet connection in the university.

Master Student (Naeem)

Have you tried to make notes on it?

Student No 1 answering

No.

Student No 2 answering

As I mentioned earlier that it diverts my direction.

Master Student (Naeem)

But if the teacher is talking on some slide and you have the same slide on the iPad and you will write on it.

Student No 2 answering

I don't use any stuff in the lectures. I will always concentrate on the lectures and write some findings on the note book. After the lecture so I worked on the slides. It is easy for me to concentrate on the lecture regarding making notes on iPad.

Master Student (Naeem)

Do you take notes on the paper?

Student No 2 answering

Yes, I use to take notes on the paper.

Master Student (Naeem)

If you use iPad for taking notes on it so how do you feel? I know you have not used it but you can try it in this semester.

Master Student (Assisting)

Is it too slow or it is hard to take notes on it?

Master Student (Naeem)

When I came to your class so, I sit at the back and not feeling comfortable while reading all the text slides from the lecture. Is it not easy if you have the same slide opened on the iPad and you can enlarge it and write some notes on it?

Student No 2 answering

In our program there are lot of figure involved which are important rather than text. Professor will explain just the figures and they are prominent in the lectures. It is easy to follow on the iPad as well but I think my attention is diverted.

Student No 3 answering

I tried to take notes on the iPad but it takes lot of time. May be we are not ready use to the iPad. I tried it only one time then I returned back to the traditional pen and paper.

Student No 4 answering

I fall during the lecture in the class by using iPad so I think it's difficult to combine both lecture and iPad for writing on it.

Student No 1 answering

I can try if there is a pen and if can be much faster than a finger to use on the iPad.

Master Student (Naeem)

I sent a video link in which students were using stylus two weeks ago.

Student No 2 answering

It's not working.

Master Student (Naeem)

I can send it again to you.

Master Student (Naeem)

10)What is the problem with reading on the iPad for so long? Because we get the result that 52% are reading less than 1 hour.

Master Student (Assisting)

Is it a problem for reading long time on iPad?

Student No 1 answering

I am not tired while reading. It's better to use for reading.

Student No 2 answering

It's not problem with the time because if you have much time so we can read it. We students have to take lectures and go to jobs and then after returning we begin to study. So many things happen in a day and the time we have so we study on it.

Student No 3 answering

For me it's no problem to use iPad in the study. It's lot more easily.

Student No 4 answering

I become tired while using iPad so, I take a break after 30 min but when I am using the book so, I will take the break after 1 hour.

Master Student (Assisting)

11)Is there anyone who is satisfied with the iAnnotate application?

Student No 1 answering

Yes, but maybe it's my fault that I am not making the things in order and putting the right name. When I download the syllabus so, it is missing to find the paper.

Student No 2 answering

I think it is flexible. I can highlight it, underline it and use different color on different points. It is easy to open whenever I stop working on it and I reopen it so I came to same page.

Student No 3 answering

It is flexible and comfortable but it is little bit slowly when we scroll down the page. Otherwise it works fine.

Student No 4 answering

I have a sharing problem between Dropbox and iAnnotate. If there is some other easy system than this so it is much better.

Master Student (Naeem)

12)Do you know about the search option in this application?

Student No 2 answering

Yes, I know sometime I am at page 105 and I want to go to page 203 so it goes directly to it.

Student No 1, 3 and 4 answering

No, I do not know.

Master Student (Naeem)

When you are using iAnnotate for highlighting and some other thing so do you know that you can share their notes with your friend?

Student No 1, 2, 3 and 4 answering

No, we have not used such a function.

Master Student (Naeem)

**13)Which tutorials have you guys used to learn all of the features?
Video? Google?**

Student No 2 answering

No, we have not used any type of tutorial. I think it is very flexible and easy to start work on it.

Student No 1, 3 and 4 answering

No

Master Student (Naeem)

**14)Is it difficult to concentrate during lectures when your iPad is on
the desk?**

Student No 2 answering

Yes, it becomes difficult to concentrate on the lecture. It's new and different thing and so many things present in it like web browsing and other thing which diverts our direction.

Student No 3 answering

It's very helpful. It's difficult to concentrate on the lecture and iPad as well. Making notes on it is difficult. It takes time to adjust with the traditional material.

Student No 2 answering

I think it depends upon the lecture because when the professor is using paper so you can use iPad with it. If he is talking about some figures and showing you something so you must pay attention towards him.

Master Student (Assisting)

Do you take notes on your paper?

Student No 2 answering

Yes but it also depends because we are very use to paper and if we become use to iPad so we start making notes in iPad. It takes time like a cell phone and computer.

Student No 2 answering

I said earlier that I fall the lecture in the class using iPad. Many time it destroy our concentration.

Master Student (Naeem)

Have you used any type of application during travelling?

Student No 4 answering

I do not have internet connection. I am travelling in a car at different places and I have mobile broadband for my pc but I do not know how to connect with the iPad.

Student No 2 answering

I only use iAnnotate PDF application and not any other applications.

Master Student (Naeem)

Not any games.

Student No 2 answering

Playing games during travelling is not morally good for the passenger sitting near to me.

Student No 3 answering

If I have internet connection so I will definitely use it.

Student No 3 answering

Yes, I also used Google earth to go somewhere.

Master Student (Assisting)

15)Have you downloaded some other application and games from the app-store?

Student No 2 answering

I have downloaded a dictionary and free translator. While we are reading so we need a dictionary for find a meaning of a word and search for a word. It becomes easy when both the syllabus and dictionary are on iPad.

Master Student (Assisting)

Why you have not downloaded any other apps? Do you not care about it or do you not know about it?

Student No 1 answering

I have some other thing to do.

Student No 3 answering

I have used Google earth, translator and some games.

Master Student (Assisting)

16) So you got gift card when you got iPad? So you all have money which you can spend?

Student No 1 answering

Yes

Practical stuff

Master Student (Naeem)

Then we'll move on the practical stuff.

Do you have internet connection?

Master Student (Assisting)

No. This sucks

Master Student (Naeem)

So, we cannot perform this test. Hold on, we have one iPad with the wired application.

The thing we wanted you to do is to go to App store and download a free application called Wired. We want to see how you like the features and how the application is built up.

We are trying to get internet working on an iPad.

Master Student (Assisting)

Basically we think, is this the future? You have 3D animations; maybe this can benefit your syllabus?

Student No 2 answering

Yeah, maybe this can help us understand things better. In Geology we need to look at the movement and such.

Master Student (Naeem)

The PDF you are reading now is very statically. It's basically just a paper right. With 3D functions you can do more and experience the syllabus in a different way.

What do you think about such functionality if you got in your syllabus application?

Student No 2 answering

It is a plus point.

Student No 2 answering

How much paper has been in 3-d format?

Master Student (Naeem and Assisting)

There is no solution today by using 3D or video in the syllabus which looks like wired magazine, but it might be added in the future.

Master Student (Assisting)

Would this be great or just normal?

Student No 2 answering

It is great.

Master Student (Naeem)

It has video functionality as well as 3D models. Let's say you find a topic and you Google on the keywords, by having this syllabus you will get a different angel of knowledge since videos will be attached and the figures will be explained in a new way where you as a user can control and rotate the figures.

Student No 2 answering

Yeah it's cool.

Master Student (Naeem)

Is it possible to move from the textbooks syllabus to electronically syllabus?

Student No 1 answering

It will happen one day in the future I think, but it will take some time. For me I really prefer the book. The combination is also good, or the best. You can read books at home, and then you can use the iPad at school for reading during lectures or while travelling.

Master Student (Naeem)

I have also many things on the papers and on a pc. Is it difficult to concentrate or work with several platforms instead of all the things are available on a single machine (iPad)?

Student No 1 answering

It's not easy, absolutely.

Student No 4 answering

It's about the background of the people too. If you are used to technology it's easier to adapt new trends like using the iPad.

Student No 2 answering

Human being always looks for options. If things around the iPad will be cheap, I would prefer the use of the iPad for example having access to wireless network.

I think combination is a good thing, when you combine the book and the iPad.

Student No 2 answering

People that are used to technology will definitely move to eBooks and electronically syllabus. This is the first time we are using eBook and that's why it takes time otherwise people will definitely move to the traditional study to eBook.

Master Student (Naeem)

I think there is only two minutes left.

Master Student (Assisting)

Have any of you used elements application?

Master Student (Naeem)

It is just like a notepad.

Student No 2 answering

No, because our syllabus is too much. We don't have much time to use it different classes.

Master Student (Assisting)

The positive thinks about the elements is that you can make your notes in the classroom and after returning home you can synchronize it with the computer.

Master Student (Naeem)

OK, thank you very much for participating in the workshop.

Appendix F: Transcription of Focus group2

Transcription of Focus group2 conducted 8th November 2010 (10:30 – 11:30)

Introduction Part

This is a workshop where we will ask questions and do some practical things regarding the iPad.

You can say what you would like to say, don't be afraid of this. Please bring up the iPad, we'll do some testing on it and ask some questions.

First we do some theoretically questions.

Theoretical questions

Master Student (Kevan)

1) How do you read the syllabus in 4220 and why?

Do you download from the web, or do you use the iPad to read it? We can do a round around the table, or we can talk together. Maybe we can start off with you.

Student No 4 answering

In the beginning, I tried to read on the iPad, but it wasn't downloaded properly, so I had some difficulties. Yeah, and then I also bought the book. I basically began reading in the book and began to take notes on the paper.

Master Student (Kevan)

So you did the old classical way of reading

Student No 4 answering

Yeah

Master Student (Kevan)

You've done it for 20 years, why should you change your style of reading?

Student No 4 answering

It's like something that you have a book in front of you; you can sort of see how many pages you have left of the chapter. I think it's easier for me to read from a book. That's my opinion

Master Student (Kevan)

What about you guys, have you tried to combine the readings?

Student No 1 answering

I would like to add something, whenever we're in a class and lecture is being given by teacher, whenever we try to take notes, the talk of the teacher is going too fast.

Master Student (Kevan)

Yeah it's going too fast, I understand that.

Student No 1 answering

Yeah. Because, I'm in the habit of taking notes in my notebooks. It will be easier, it's very easy to work on paper. We are not used to take notes on the iPad.

Master Student (Kevan)

I assume that you guys aren't used to take notes using a laptop either?

Student No 4 answering

Not really

iPad is good for when we have group sessions. When we are looking at slides during exercises. It is very nice to go to the web and look at the slides since there are some relevant information in them. So this is a good way using the iPad.

Student No 1 answering

One thing from my side, we have the option to write text on the iPad, but instead of that we should have stylus, like if we want to add something in our text, we can write it directly using a stylus.

Master Student (Kevan)

Yeah, like a pen.

Student No 1 answering

That's the problem I've seen.

Master Student (Kevan)

Because you know how to write with a pen, it takes some take to write on the virtual keyboard.

Student No 2 answering

Because we aren't fast typers.

Student No 1 answering

We have to into settings and select different things in iAnnotate, mean time the teacher is long gone. We should have a pen and should focus on writing instead of focusing on the iPad

Master Student (Kevan)

I was in your class some weeks ago; I saw that everyone was writing on the paper and not on the iPad.

Student No 2 answering

Because when you joined the classroom, that was our first lecture. We have now used the more compared to what we did earlier since the course started in October.

Master Student (Kevan)

I understand.

Student No 2 answering

Most of the time we study together in groups, we discuss all the things together. We are in the habit of that. We attend to use the iPad when we study together, but when we are in the classroom we attend to use the paper.

Master Student (Kevan)

Do you guys agree this opinion, or do you have other things in mind you should share?

Student No 3 answering

I agree with most of the opinions, it's difficult to type while listening to the lecturer.

Student No 4 answering

The first lecture we had, there was no proper tables. You cannot type with one hand. It's difficult to hold it as well when you don't have the iPad case either.

We have changed the classroom, so I guess it'll be easier now. But you still have a strange angle since you will place the iPad on your table.

Master Student (Kevan)

You should have the iPad case then.

Student No 4 answering

Yeah, yeah. That will be a good thing to have.

Master Student (Kevan)

2) Why haven't you guys used the printer so much?

Student No 4 answering

I have tried to print out power point slides from front to take notes on them. I have to revise afterwards, it's nice to have everything on paper.

Master Student (Kevan)

Do you guys do the same?

Student No 1 answering

I didn't print any paper. I think we should read more from the iPad. There is so much we should have to read. I think it's easy to read from the iPad. I didn't print anything, because I have the syllabus stored in the iPad.

Master Student (Kevan)

So you use the iPad for reading a lot then?

Student No 1 answering

Yeah

Student No 2 answering

Secondly, printing is a problem since we have to come to the university and login to print your stuff. When you have the iPad, you don't need to print anything since everything needed is available on it.

Student No 3 answering

Instead of printing the slides, I use the iPad to read the lecture slides which I downloaded from fronter.

Master Student (Kevan)

- 3) If the students have a choice where they choose between iPad syllabus and regular book syllabus, what would you have bought?

Student No 2 answering

IPad, but definitely with a stylus.

Student No 3 answering

Do we get to borrow the iPad from you?

Master Student (Kevan)

Let's say you have the iPad already. Everything is free, you either go and buy the book on the iPad or you buy it physically with text and paper.

Student No 3 answering

Book paper.

Student No 1 answering

Book, because we are in the habit of buying books for the last 15-16 years.

Student No 4 answering

Me too. I have already done it, so.

Master Student (Kevan)

- 4) What kind of problems have you had with the iPad during lectures, you have mentioned some already.

Student No 1 answering

Mainly the problems are taking notes. There is no time to take notes on the iPad. We use the device only for reading after the lectures. It's a device we would not use during lectures since we are not in habit of doing it. Besides, our typing is slow and the teacher is moving fast. It takes too much time to type in everything.

Master Student (Kevan)

So the main problem has been taking notes

Student No 2 answering

Yeah

Student No 1 answering

Yeah

Master Student (Kevan)

Some students had some issues with the PDF files since they were really slow, is there any issues at the moment or is it going fast performance wise?

Student No 1 answering

First syllabus that provided to us was pretty slow, but afterwards it got updated and we were pleased with that compared to what we had. The first one had problem with hanging and lagging.

Student No 4 answering

Taking notes in classes is also a problem. It's difficult because whenever the professor draws a curve, it's kind of difficult to do the same on the iPad. We ended up using paper instead. There is many things that complicates the situation.

Student No 3 answering

The same thing here.

Master Student (Kevan)**5) What is the problem with reading on the iPad for so long?****Student No 2 answering**

I didn't find any problem reading for so long

Student No 1 answering

We have all the syllabus in one device. We usually use the iPad after class. Sometimes internet access is needed, we don't have Wi-Fi access at kringsjå where we live. It happens sometimes that I must look up a particular term. I do that by starting my laptop since it got wired internet access.

Student No 3 answering

I never read on it for 3-4 hours straight, so I really don't know.

Student No 4 answering

After an hour or so of reading I get pain in my neck, since the angle is wrong.

Master Student (Kevan)**6) Is there anyone who is satisfied with application?****Student No 3 answering**

I never used the annotate possibilities. The issue with the lag is the thing that annoys me.

Master Student (Kevan)

Yeah, the main issue were the PDF's who were not optimized for the iAnnotate application. Thus it was taking too much time to load the pdfs. Most of the pdfs were scanned in from text.

Student No 1 answering

We didn't really use the features in iAnnotate to do annotations and such. The only thing we used the application for was to read.

Master Student (Kevan)

You used it for reading basically, and not taking notes and annotating?

Student No 1 answering

No. we didn't take any notes.

Master Student (Kevan)

7) Do you know the search function in iAnnotate?

Student No 1 answering

There is a dictionary that I use most of the time, but it's not in iAnnotate, it's a different word application I have downloaded from app store.

Master Student (Kevan)

I assume that some of you use the search option within this application to search for keywords or something within the syllabus?

Student No 4 answering

I haven't really used the search option, but I use it on my computer. I use my computer more..

Master Student (Kevan)

So you have downloaded the syllabus into your computer?

Student No 4 answering

No, not really. I use the search function when I read articles and such. I haven't had the need to search anything in the syllabus. I haven't really read the syllabus on the iPad, that's probably the reason.

Master Student (Kevan)

8) Which tutorials have you guys used to learn all of the features in iAnnotate for instance? Videos, how-to's etc.

Student No 3 answering

I goggled how to delete application...

Student No 2 answering

I have also consulted YouTube for some videos, methods how to write, how to take notes. I have also consulted the videos you have uploaded to Fronter. I really got benefit from the guides.

Student No 1 answering

Whenever we are searching on the Internet for articles and such, there is no good option to save the articles you found. I'm using the standard safari browser.

Master Student (Kevan)

Safari uses a different path to save files and directories. If you need to download and access the content you have downloaded from safari into iAnnotate, you need to use the browser function within iAnnotate.

Student No 1 answering

Ahhh, most of the time I have used safari to download stuff. So that kind of explains it.

Master Student (Kevan)

So uhm, I don't think there is any more input on this question, next question:
What kind of flaws do you think exist in iAnnotate, or what features are missing in it?

One of the things that you have mentioned is pen, so you can write notes. Is there anything else you guys would like to add in iAnnotate that is missing, or would be cool to have in the application?

Student No 4 answering

I had some problems with the letter ÆØÅ. I guess that can change in the future with software update.

Master Student (Assisting)

Yeah, that will come in an update soon in November.

Master Student (Kevan)

Like a keyboard where you have ÆØÅ in the keyboard

Student No 4 answering

Yeah, you need work a bit harder to find those letters today.

Master Student (Kevan)

Is there anything else you would like to have?

Student No 1 answering

I have downloaded 2-3 games to the iPad

Master Student (Kevan)

I was thinking more of the iAnnotate application, if you would like to have some extra functions in it?

Student No 1 answering

Yeah, the thing missing is the pen, where we can write notes on it as we do on the paper.

Student No 2 answering

Like we said earlier, it takes too much time to write notes on the iPad in the class with a virtual keyboard.

Master Student (Kevan)

9) How do you cooperate between students? Its easy to cooperate in real life

Student No 2 answering

We usually have the iPad with us all the time, its quite easy to share information. I can show my friend my iPad and for instance explain what the figure of the mountain looks like. We can then sit and discuss around it.

Master Student (Kevan)

Okay, that's the way of communicating.

Master Student (Kevan)

Is there anything else you guys have done?

Student No 4 answering

During group sessions, when we are looking at information on the web for the course for instance, it's easy to share the information and nice to zoom in on the actual page. It's a better resolution than when you print it out.

Master Student (Kevan)

Do you have the same opinion?

Student No 3 answering

Yeah.

Master Student (Kevan)

You have an option in iAnnotate where you can send notes to each other by email. You can actually send the whole syllabus with the notes using that function.

Master Student (Kevan)

10) Is it difficult to concentrate during lectures when you have the iPad at your desk?

Master Student (Kevan)

You mentioned something earlier about angels and such, but is it difficult to concentrate?

Student No 3 answering

I never used it during lectures.

Master Student (Kevan)

Because you have your own type of study method?

Student No 3 answering

Yeah

Student No 4 answering

I have seen friends of mine in the lectures going to facebook and such..

Master Student (Kevan)

So it depends on what the teacher is holding a lecture of then?

People laugh*

Master Student (Kevan)

Is it the same experience here?

Student No 1 answering

Yeah almost. During lectures if I have some spare time, I sometimes check the email or on Facebook to see what's happening there.

Master Student (Kevan)

11) Which application do you use while travelling? Bus, train, etc. Which applications do you use?

Master Student (Assisting)

If you're using it when you're travelling.

Student No 1 answering

No, I didn't use any kind of application during travelling particularly, because we just have a run short of time, only 10 to 15 minutes to go to Kringsjå and... You don't need to take your iPad with you in your hand unless you...

Master Student (Kevan)

Ok, I can understand that when there's 15 minutes travel time. But, have you guys experienced any...?

Student No 4 answering

Well, yes, I use my laptop more when I travel. Because I got lots of documents... Yes, I guess I've got most of my stuff downloaded on my laptop. I find it kind of unnecessary sometimes to have the iPad, because it's so similar, and then you have everything on your laptop anyways so. It's like to have things stored two places, and then you have to carry both of them everywhere, it's a bit unnecessary maybe.

Master Student (Kevan)

Things like synchronization and stuff like that. "Oh, I have some notes here, oh I have something there". Which is the latest one? So you have that confusion.

Student No 4 answering

Yes.

Master Student (Kevan)

Is that the same thing?

Student No 3 answering

I didn't use it while travelling.

Master Student (Kevan)

Ok. Because you look kind of cool as well you know, when you sit on the T-bane for instance. Take up the iPad you know, and sit there and people, you know, tend to, because it has not been released in Norway yet, so it's... There is hype around it.

Student No 1 answering

Because in during, one time I just took it out in train, so one guy who was present around me, he just said, “Oh, yes, it’s great”. First he discussed this thing with [Ishur?], and then after that I was thinking that he will ask me about the price of this, so after that he goes “Oh guys, very nice device, and how much have you paid?”. I told him that I have gotten it from my university just for study purpose. But you can say it’s [crazy?] when the people to have this item.

Master Student (Kevan)

Last question is that... Do you think the iPad can replace the syllabus? No?

Student No 4 answering

No.

Master Student (Kevan)

Because you have the textbooks and it’s not possible as it is today to replace it?

Student No 4 answering

I don’t think so. Well, well, I’m probably old fashioned, but I like kind of having a book in front of me and yes, to flip the pages.

Master Student (Kevan)

So let’s say you were like five years old, and we gave you an iPad and no textbooks.

Student No 4 answering

Ah, I don’t know. I think I would have started to cry.

Student No 1 answering

Yes, I think so that the iPad can replace the syllabus in old style of reading the lectures if you provide two things, and number one is a pen and number two a USB slot.

Master Student (Kevan)

USB slot? Ok.

Student No 1 answering

Yes. So that if you put something or if you add something on your, you can say iPad material, with the help of a USB slot you can download or you can print it out so that...

Master Student (Kevan)

You can share it.

Student No 1 answering

Yes, those two things. And it can be, you can say, it can be good for people in the passage of time. It will take time, because we are old people and we have been doing the habit of reading [to books to north?]. Something likes that. But it definitely, well, you can say, get familiar with new generation. Definitely.

Student No 2 answering

Because whenever you strategy or study and you have only one option, study from iPad, because we don't have so much time to just learn, because it takes some time to have some, you can say, to use very easily and quickly.

Master Student (Kevan)

Of course, you're all on the master's degree level right, so you don't have time to learn new things, because obviously you want to pass this course and continue with things you're doing. And if you try to gamble with, you know, how you do studies and such. That's maybe not the proper way of doing it on this type of timing. Maybe you could do it earlier on, or maybe later on, when there is no importance, as such today. So you guys don't think it's possible to replace it? You said yes, she said no. And...

Student No 2 answering

Well I think so, if it is provided at the starting of you can say, you're college or university.

Student No 1 answering

If you want to replace the old style of learning, then you have to give it to, you can say, 5th, 6th, 7th, 8th grade students. Then they will become used with it by the passage of time. You have to [migradulen?] rather than just giving the iPad to the [universich wrench?]

Student No 2 answering

One thing I use in my country. I use Internet when I was in great [samun?], and first of all for some games and videos and all the things I use on Internet. But after that, when I came in to the university, I use it for my, you can say study purpose. [Purdy gurdy?] the Internet. Because I have so much options within that book you can say. But you can say if we have... If the student have iPad with an [aitliece], then he first he will go for some games and videos, and after that, whenever he's very handy with that device. Then after that, he can use it for his study purpose. Because, you can say, the nature of human being, he always goes for the fun first. If he find something. Then after that he will be very flexible with that device.

Master Student (Kevan)

Because you guys have used iAnnotate, the application itself. And the university library has tried, you know, to do the setup for you guys, so you can start using it with PDFs and such. But as you're saying, you're using your laptop because it's the same thing right? And you guys are using it because you have got iPad. But is there anything new about it, or is it the same thing? Just, you know, it's portable, you don't have a keyboard, and it's, you know, is that the only thing difference? Or is it same as a laptop?

Student No 3 answering

Maybe similar to a laptop, different wrapping.

Master Student (Kevan)

Yes. Because that's the way we have sort of given you this setup with iAnnotate. Its PDF files, right? It's only text files, so it's no fun. It's a normal thing to have, so it's... because you're using a laptop and obviously some of you guys are using the iPad, but yes. We're going to do a practical thing now on the iPad, and then we're done. So we can start off by going to the App Store. So we're going to install an application called Wired. Wired Magazine. So go to App Store first.

Student No 2 answering

So you can say I have a problem with, you can say, being logged in. Because I have changed this iPad.

Master Student (Kevan)

Ok. Shore. I think you need to connect to Wi-Fi first. Is there a Wi-Fi around here? Ok, if you go to Safari. Did you find the application?

Student No 3 answering

Wired? This?

Master Student (Kevan)

Wired Magazine yes. On the left side, the red one.

Master Student (Assisting)

Actually, I don't have Internet.

Master Student (Kevan)

You don't?

Master Student (Assisting)

No.

Master Student (Kevan)

Oh, Ok. Which access point are you connected to? I think you're Internet is working, so you need to find out which access point he is on. Let's see, it's connected now, let's go to Settings and find out. UiO. It's still not working.

Master Student (Assisting)

I am right now on Eduroam. It didn't work with UiO.

Student No 1 answering

Settings?

Master Student (Kevan)

We can go into Settings, and then we can go into Wi-Fi. And then we can choose Eduroam. Then you can type in your username and password.

Student No 1 answering

Can't connect to network.

Master Student (Kevan)

Hmm. Oh, this is the username and password for the university. So it's only like your username for the university when you log into Fronter for instance. I think that's different. That's your first name, and one of the letters in your second name.

Student No 1 answering

I don't remember exactly.

Master Student (Kevan)

Ok, it's fine. We have at least two iPads, so if it doesn't work we can just use... That's the think you're talking about. The angle.

Student No 4 answering

He he, yes.

Master Student (Kevan)

Ok, let's just leave it. It doesn't work.

Master Student (Assisting)

Do you have Internet connection?

Student No 3 answering

Yes.

Master Student (Assisting)

Then we can use those two, for example? I have Wired on mine, so if, yes you have downloaded wired?

Student No 3 answering

Yes.

Master Student (Kevan)

Can they just borrow your for two seconds, and yes.

Student No 3 answering

Ok.

Master Student (Kevan)

The thing we want to show you is an application called Wired. You can start it up, and it's a technical magazine from the US. Just press Ok.

Master Student (Assisting)

You have to download the magazine. It's 50 megabytes.

Master Student (Kevan)

This? Ok, hold on. So this is all the magazines. One of them are free. Yes, it's 50 megabytes. We're just trying to show you how this magazine is developed, or how you feel what the opinions are about it. And we will ask some questions about it to see if it's something that can be a syllabus in the future. So press View and it will start up. So you can start off by, you know, going to left. The navigation part is just something you need to know, or need to try and find out. You can go left and right. And you can go upwards and downwards as well on some of the articles. It's like reading a magazine which has more pages underneath it. So the first thing I want to show you guys is this page where you have these two pages there. The first one is... So you're reading an article, right? And there is a video which is built in to this article. So when you press play on this video, it will start up. So you're still reading the magazine, but inside of the magazine you have a video built in. That can be interesting. So you can just quit that, I think it lasts for two minutes or something. Just press done.

Master Student (Assisting)

You can press done in the corner.

Master Student (Kevan)

And underneath it, there is, if you go downwards, there are some robots you can see, but if you press on the arrows, there is a 3D figure. It will actually move around. That's a nice feature.

Master Student (Assisting)

You can slide the feature to see.

Student No 4 answering

Oahu!

Master Student (Kevan)

So you can do the same there, right? You can sort of interact with it.

Student No 2 answering

Yes. Because we have, you can say, for my 3D data, [neorogus?] science. We can see it in different angles.

Master Student (Kevan)

Yes. So these are some of the basic things on this application, where you have the opportunity to have videos, and you have the opportunity to have figures, 3D figures inside of a magazine. The things we want to find out is, is this something that you guys could have in your syllabus, for instance, like you said, have 3D figures of the mountains, to see how it looks from different angles. To see in it, to see out of it, you know, to see every angle, while you're reading from the syllabus or from the Fronter slides. Or, you know, being a textbook which you bought. Maybe you could have videos in it, which sort of gives you another feedback. So it's more of a interactive syllabus or a interactive book. You sit there, and you read it, and you understand it properly, but in addition you have 3D figures and you have videos and you have other cool functions. Is this something you can think of in the future to be in your syllabus? Will that be more interesting for you guys? Or will it be maybe too cheesy and, you know, maybe it's not something you would like to have because you guys are master students, and you would like to have a paper with full of text. You know, the abstract first, and then you go, you know, with the whole setup. So this is one of the major questions we want to ask you guys. What are your opinions about it?

Student No 1 answering

It would be really bombastic and splended if you people do that with the 3D modeling, 3D figures, with videos and with text if person particularly, you can say me, get to have any kind of problem with, you can say, syllabus or with that reading [modulian?] that I can switch to a video mode or I can switch to a 3D mode. It would be really bombastic!

Student No 2 answering

But, you can say, there is a long time to do all that material to create such books and create such material. So, you can say, it will take... I don't know, maybe 15 to 20 years, because whenever you have all your data on e-books, and just add some videos and that, and then we have some, you can say, 3D images and all the figures and that.

Master Student (Kevan)

Yes, it's of course a challenge and...

Master Student (Assisting)

It's not done tomorrow.

Master Student (Kevan)

But there is some negative parts here as well, right? Like yourself, you're like a typical student, right, who likes to read books and, you know, just remove the iPad, and, you like your textbook, right?

Student No 4 answering

Yes.

Master Student (Kevan)

And that's fine!

Student No 4 answering

Yes, but of course I do appreciate like models especially. It's very like in geology, there's a big need for modeling to see things in three dimensions. So I think that would be a great part to our syllabus sort of.

Master Student (Kevan)

As an additional thing then, maybe?

Student No 4 answering

Yes, well, I guess if you had like syllabus on iPad with models, I think I would have used iPad more probably, because it would be like a good supplement with reading. Because then I probably would have got a better learning. I think that would be a crucial part point for me,

yes. Because there's like a lot of web pages where you can go and look at models, but it's kind of hard, or it takes a bit more time to go in there while you're reading, but then to have it in your syllabus would be great.

Master Student (Kevan)

But the way I presented this, it looks so cool, he said bombastic, and it's so fun, but still, if you want to pass your exam, is this something you would like to have? And also, we were thinking of adding more interactive syllabus in the future, meaning that you have more of interaction between, so let's say in this magazine here, you can convert the magazine, remove the fancy stuff, and have an article in there, right, which you would like to read. Or have textbooks in there, which you would like to read. So let's say you read this article and you want to find out more about that topic, and to find out more about that topic, you go to Google, right, or Google Scholar or any other, you know, repositories where you can download these things. What if everything was included? You only had to read it once. And you had videos, you had external links. Everything was attached to it in a nice way. So when you read it, it was "wow, I don't need to do any more reading". But maybe a part of doing studies is to do research and read other opinions instead of everything presented for you. But in this case, my question is: Do you think this will be a replacement for textbooks in the future, or do you think text is enough? We don't need to have any videos related to it. We don't need to have any 3D figures. We don't need to have any, you know, sounds. Because the thing we are trying to is to have an interactive syllabus, which means that you can do things with the syllabus. That's maybe good for children or, you know, people in 5th or 6th grade, because then you can for instance learn about Africa in a new way, right? You press the Lion, and, you know, you will see a lion when you're six years old, and that's you know, that's pretty cool! The only thing we saw, when I was at school. It was only pictures, you know. And maybe a movie once a year or something about things, so I learned it that way. But if you have an interactive syllabus, will that change something?

Student No 1 answering

In my opinion, it will change definitely because if you just give us or give to 3D images and videos to our children, in a long way a syllabus, they will definitely constrain on 3D videos and, you can say 3D videos and models as compared to syllabus. Maybe social networks can change something. I am thinking of comments like facebook. Of course you can say again moving things attracts or rather than, you can say our syllabus, of course if you, if somebody read the syllabus, after some time he will be feeling dizziness and will be feeling sleepy. If you are giving 3D images and videos, nobody can feel tiredness or feeling sleepy. He will be [atantive?] all the time.

Master Student (Kevan)

It will be videos of course about that topic. Not a movie or... Do you think the same thing, or do you mean that maybe we should have this for children or... You know, you can not replace mathematics formulas with videos, right. That's not possible.

Student No 4 answering

I guess there's a great potential in like having tests on your iPad for example, or like you can after each chapter you can take a test and see what I understood, to learn better on that way. And also having models is very great as well, and I guess videos.

Master Student (Kevan)

So that will mean that it will be possible to have sort of a small school inside of the iPad, where you sit there for like one hour and you read a chapter and in the end you have an exam or a test of what you have read. And the experience you are getting is something is included in the video, something is additional to the video, you have text, you have 3D figures and stuff like that. So you mean that it's possible, but...

Student No 4 answering

Yes, I think it's good to have more dimensions than just reading. In your learning process, but then again, it's kind of like... Then I start to think like if the iPad could like exclude teachers. I think you also need like input from a real person.

Master Student (Kevan)

Do you feel the same thing, or?

Student 3: Yes, as a supplement to, you know, just text. Visualization. It can help very to understand the material better.

Master Student (Assisting)

Have any of you heard of iTunes U? It's something the teacher can record the lectures on video, and they can upload it to iTunes University. You can download the videos on the iPad. I don't think there is much from University of Oslo, but for example Stanford have a lot of lectures available for everyone, both the ones who's taking the lectures and everyone else in the world. Could that be something, if you can download the video of a lecture, for example a couple of weeks after the lecture? Would you have done that, you think?

Student No 4 answering

To see the things again?

Master Student (Assisting)

Yes.

Student No 4 answering

Yes, that would be great! Because there's like, it's difficult to remember everything that is told during a lecture.

Master Student (Kevan)

Last question. If you have the option to choose between iAnnotate syllabus the way you have the iPad now, and this syllabus which I showed you now with the Wired Magazine, but this is not the syllabus, you need to do a lot of modifications here, would you have chosen iAnnotate, because that's you know, that's text. You know it works. Everything is there. Or would you have chosen something like that?

Student No 1 answering

Something likes that, definitely. My opinion.

Master Student (Kevan)

Because you like technology, right?

Student No 1 answering

Yes, definitely.

Master Student (Kevan)

What about you?

Student No 4 answering

Well, hopefully the syllabus would have been in that format or it would have been all there, but just with more figures and more 3D figures. So then I would have chosen the, yes, that one. Perhaps social network could be combined into this solution.

Student No 1 answering

Because, you can say, in iAnnotate all the pages and all the things and 3D data, so this application which we have seen now, that magazine, it's a better thing than iAnnotate. If all the books or all the material are just presented in that way. At the same time we have the both options, you can say.

Student No 2 answering

Second thing is that people are more for the figures and very simple text. It's, you can say, human cycle. You just told before that we just have text or a figure of line asking the children have no ideas, they just press the button and just saw the line moving. Right? They learn more about the line as compared to people like us. We just saw the line. What kind of line. That's a matter, and if material is provided in that shape and 3D modeling and moving videos, it would definitely learned a lot as compared to just reading the text.

Master Student (Kevan)

And you share the same thing, or is it, depends?

Student No 3 answering

I mean, it looks very good, and I guess it's adapted to the iPad.

Master Student (Kevan)

Yes, it's an application developed by Wired, and the magazine has also been developed by Wired. So but, yes, it uses the iPad technology, so the figures and such, that's coming from the iPad.

Student No 3 answering

It looked very good, compared to...

Master Student (Kevan)

The text thing we have.

Student No 3 answering

Yes.

Master Student (Kevan)

Do you have any questions from your side?

Student No 1 answering

No.

Master Student (Kevan)

I think we're done now. I think its lunchtime now. Thank you very much for all of your answers, and there is free lunch downstairs, and we can do more talking there.